WORLD'S POULTRY SCIENCE JOURNAL

OCTOBER - DECEMBER

1956

Official Organ of the
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Volume 12 October-December Number 4

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Published quarterly by the

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Cornell University, Ithaca, N. Y., U.S.A.

Membership dues $3.00 a year of which $2.50 is for a year's subscription to the "World's Poultry Science Journal." Subscription rate, $3.50 a year. Advertising rates upon application.

Entered as second class matter May 31, 1945 at the Post Office at Ithaca, N. Y., under the act of March 3, 1879.

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THE PROBLEM OF GEOGRAPHICAL ADAPTATION OF POULTRY*

D. C. WARREN

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The chicken is the one domestic animal which is cosmopolitan in distribution and has remained quite similar in nature throughout the world. Most other domesticated animals are limited in distribution and show special adaption to specific geographical areas. There is little experimental evidence to indicate that poultry have any important geographic adaptations. In America there is a wide range of climatic conditions from arid to extremely humid zones, and from tropical to very cold climates. Hatching eggs and day-old chicks are now readily transported by air from the State of New York to California, and from North Dakota to Louisiana.

The New Hampshire breed which was developed relatively recently in the State of New Hampshire has become a most popular breed over much of the southern area of the United States. The point of origin seems to be of little importance and the poultry keepers in America have little concern regarding this matter.

Doubtless there are genetic factors which influence a bird's performance in varying environments. It is well known that the larger breeds are more susceptible to heat prostration. However the wide adaptability of poultry makes it possible for them to perform well under variable climatic conditions. The numerous random sample tests now being set up in America doubtless will demonstrate limited differences in performance of specific strains and breeds in varying regions of the country. These adaptations are known to the population geneticists as genetic-environmental correlations. As yet such correlations seem to be of minor importance in poultry breeding. In Canada some tests have been conducted comparing several strains of chickens kept under widely different conditions and it was not possible to demon-

* Presented at meeting held at Poona, Bombay State, India, Oct. 17-27, 1955. Report of the Technical Meeting on Poultry Production in Asia and the Far East. Food and Agriculture Organization of the United Nations. Rome, Italy, February, 1956.

strate any changes in rank of the stocks performing in the different localities.

This problem of geographical adaptation is of considerable importance when attempting the importation of poultry stocks into a new region. There is always a question as to whether breeds of poultry developed in Europe and in America can be expected to do well in Asia and in the Far East. It would seem that the indigenous chicken must, through evolutionary action of natural selection, have fitted itself to the region of its origin. One is confronted with the problem as to the importance of natural selection as compared with the influence of a systematic and scientific application of rigid selection when applied by man. A few years ago the observer from U.S.A. visited the island of Puerto Rico and had the opportunity of seeing the poultry breeding there. Workers in Puerto Rico were convinced that American breeds would not survive under their hot and moist climate and they were therefore using a system of grading up their native poultry.

The observations the author has been able to make of American and European stocks in Egypt, Turkey and now more recently in India, have brought him to the conviction that as far as climatic conditions are concerned, poultry stock developed in Europe and America can well adapt themselves to the climate of Asia. They seem to thrive if given favorable management. There is one question which is always raised, however, and that is whether these imported stocks will be able to compete successfully with the indigenous poultry, under the rigorous environment of village management such as have been seen in Egypt and India. On the other hand it can justifiably be questioned as to whether we should expect any poultry production progam to be of much consequence if carried out under the existing village conditions. Under its second Five Year Plan India is attempting to improve the village management of poultry.

It cannot be disputed that poultry which have been subjected to long periods of rigid selection, must have a genetic constitution which should be of value for the prompt improvement of stocks having been given less breeding attention. The question is, just how can one best take advantage of these sources of desired genes. It is possible that some of the better strains and breeds of Europe and America can be imported to and propagated in Asia to the economic advan-

tage of countries receiving them. Such importations should first be tested critically in a new environment before giving them wide distribution. Doubtless various American strains may differ in their performance in the Asiatic environments. It should also be kept in mind in making any importation from America that there is a very specialized industry, some stocks of which are kept entirely for meat production and others for egg production. If meat strains are imported for purposes of egg production they are likely to prove to be a disappointment. Furthermore many of the American commercial stocks are the result of crosses of strains of chickens and the offsprings of such importations are likely to give unsatisfactory results because of genetic segregation.

Indigenous breeds of any country should not be discarded for they must have acquired through evolution some genes which should be of value. The work here in India with indigenous stocks certainly appears to be a promising technique. The author has recently had the opportunity of comparing the Fayoumi breed of Egypt under American management conditions. Though both its body size and egg size are too small to meet U.S. requirements, this breed does show high egg production, excellent shell thickness, and high resistance to leukosis. As far as could be determined the Fayoumi breed had had virtually no scientific breeding attention and had not been greatly exposed to leukosis disease. Here is a relatively undeveloped breed which has characteristics which may be of value to American poultry production.

In conclusion it can be stated definitely that the chicken is sufficiently adaptive to permit the use of concentrations of desired genes found anywhere in the world. The best methods of taking advantage of these favorable qualities are not yet well demonstrated. Probably the most successful techniques will include importations, acclimatizations and selection of the stocks in the new environment, and incorporation of the most useful genes through up-grading of indigenous stocks. No one country has a monopoly of the most desired set of genes of the fowl. It is through conferences such as this and the exchange of stocks that the highest level of performance in poultry can be attained.

PROGENY TESTING FOR HIGH EGG PRODUCTION

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Egg production in Egypt is a very important enterprise because of the unique position which eggs occupy in the human diet and because high laying strains convert feed into an animal-protein food relatively more efficiently than do practically all other classes of livestock.

Poultry leaders in Egypt are faced with a wonderful opportunity to increase the economic importance of the poultry industry because, in certain other countries, the progress made during the past decade in breeding for rapid growth, superior fleshing, and high egg production has been relatively greater than the increase in the efficiency of red meat and milk production by the larger classes of livestock.

From the standpoint of breeding to increase the efficiency of producing eggs, milk, and red meats, chickens have a distinct advantage in being much smaller in body size and each dam and each sire has more numerous progeny per generation than in the case of the larger animals. In a long-time breeding program, much more intensive selection pressure is possible each generation in selecting prospective sires and dams in the case of poultry than in the case of dairy cattle, gamoose, beef cattle, sheep, and swine.

In addition, relatively more of Egypt's farming population is engaged in poultry raising than in raising larger animals. A relatively small flock of chickens often means a lot to many a village and farmer.

With respect to egg production, the feed consumed by layers is used for maintenance (maintaining body functions and providing heat and energy), for increase in body weight that may occur, and for egg production. Under average conditions, about 70 per cent of the feed consumed by layers is used for maintenance and about 27 per cent is used for egg production. The lower the level of egg production, the higher is the percentage of feed consumed that is used for maintenance and the lower is the percentage of feed consumed that is used for egg production. It is obvious, therefore, that a high rate of laying is necessary for efficient production. This is particularly important in view of the relatively high cost of poultry feed in Egypt. By far the most important problem confronting the Egyptian poultry industry is the need for

developing a sound, long-time program of pedigree breeding and progeny testing for high egg production. This involves the training of personnel at the Ministry of Agriculture poultry farms and at other centers in Egypt from which so many chicks are distributed to farmers and villagers. Private poultry breeders should be encouraged in every way possible to adopt improved selection and breeding practices.

It should be understood, of course, that the progress achieved at any poultry breeding center will be influenced greatly by the management of the breeding and laying flocks, the kind of diets they are fed, and the accuracy of records kept.

The prospects of success in developing high-laying strains of breeding stock will be determined largely by the mental caliber and training of those responsible for carrying on the breeding program and the pride that they take in making a notable contribution to one of Egypt's most important branches of agriculture.

FACTORS DETERMINING FIRST-YEAR PRODUCTION

The most important factors determining the total number of eggs laid by pullets during their first year of laying are: age at sexual maturity, rate of laying, and persistency of production.

Age at sexual maturity is the age in days from the time a pullet was hatched to the time she laid her first egg. The earlier in life that a pullet commences laying, the sooner she produces revenue but she should be of relatively good body size or her eggs will be very small during the first few weeks of laying. Leghorn pullets hatched at the same time as Plymouth Rock and Rhode Island Red pullets usually commence laying at relatively a slightly younger age.

The rate of laying is determined largely by the number of eggs per clutch, which is the number of eggs laid on consecutive days. A new clutch is started one or more days after the termination of the preceding clutch, depending upon the inherent laying ability of the bird. Very poor layers may skip three or more days before starting the next clutch, and each clutch is usually not more than two eggs. Good layers usually lay in clutches of three or four eggs, and the intervals between clutches are usually not more than one day. Very good layers usually lay for several days in succession, one of the longest clutches on record being that of a White Leghorn that laid 223 eggs on 223 consecutive days.

Persistency of production refers to the period of laying up to the cessation of egg production immediately preceding the onset of the first complete molt. Some of the best layers in a flock continue laying while molting. It is obvious, of course, that the earlier that molting begins in the summer, the shorter the period of production during the first laying year. For the purpose of comparing the laying ability of different birds in the flock, most poultry breeders consider the first laying year to be 365 days from commencement of laying.

In concluding the discussion of this particular section, it is self evident that in order to make an outstanding record during her first-laying year, a pullet must commence laying relatively early in life, lay at a good rate, and continue to lay for approximately 10 months from commencement of laying.

THE NECESSITY FOR PROGENY TESTING

The heritability of egg production is relatively low, which is another way of saying that the egg-production record of a female is not a reliable index of her ability to transmit high egg production to her daughters. By contrast, the heritability of a character such as white plumage is highly heritable, which means that the bird with white plumage has the genes for that kind of plumage and neither the kind of diet nor environmental factors influence plumage color. Egg production is expressed in females only, a fact which makes progeny testing to increase egg laying ability all the more important.

The fact that the number of eggs laid by a dam during her first laying year has relatively little significance in determining her breeding worth is shown by the following results secured with Rhode Island Reds:

Average egg production of dams:	200	240	280	320
Average egg production of daughters:	190	214	220	228
Differences	10	26	60	92

Progeny testing to develop high laying strains involves the selection of prospective breeding stock on a family basis. It is necessary to determine the average egg production of all of the daughters of each dam and the average egg production of all of the daughters of each sire. Excessive culling of the flock during the first laying year should be avoided.

The best test of a bird's breeding worth is the kind of progeny it produces when mated to other individuals. There

are certain limitations in applying the progeny test, however, especially in the case of females. Usually, during each breeding season, a female is mated to one male only. The egg production records of their progeny serve as an index of the breeding worth of that particular dam and that particular sire.

Actually, in order to determine the real breeding worth of a female, she should be mated to two or three males during the same breeding season. However, the number of daughters secured from each mating would be rather limited. It would be desirable to secure from each dam and each sire to which she was mated about 8 or more daughters to put in the laying house. Mortality during the growing season must be allowed for. Females for future breeding purposes should be selected first from among the progeny of each sire that proved to be superior in transmitting high egg production and second from among the full-sister progeny of each superior dam.

The ability to identify sires of outstanding breeding worth is relatively more important than the ability to identify dams of outstanding breeding worth. This is because each sire has several times as many daughters as has each dam to which he is mated.

Since it is important to identify as many superior males as possible, changing the males in the middle of the breeding season is recommended. This makes possible the testing of twice as many males in one breeding season. The first male in the breeding pen is removed 10 days before the second male is placed in the pen. During the first 5 days after the first male is removed from the breeding pen, all chicks secured from the pen may be credited to him. Beginning 5 days after the second male is placed in the pen, all chicks secured from the pen thereafter may be credited to the second male.

It is desirable to mate as many as 15 or more females to one male, at least 3 families of 5 or more full sisters being desirable.

There is an advantage in selecting pullet breeders on the basis of their egg-laying performance from the commencement of laying to the end of November or December of the year in which the bird was hatched. There is a genetic gain per generation and poor families can be culled when the good families of pullets are saved for breeding purposes.

Approximately 15 or more single-male matings of each breed or variety should be maintained from year to year. In order to make the most progress in developing a high laying strain, each poultry breeder must maintain numerous matings from year to year and he must practice intense selection pressure in selecting future breeding stock each year.

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FEEDING COTTONSEED CAKE (WHOLE PRESSED) AND BERSEEM HAY MEAL TO LAYING PULLETS IN PAKISTAN

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Protein is an important constituent in the ration of layers. Animal proteins have given satisfactory results; but no data are available in this country with respect to the value of vegetable proteins in the rations of poultry. This is probably due to the fact that apart from cottonseed and rapeseed cakes, no other vegetable protein sources are available in sufficient quantity to be used as feeds for poultry.

Rapeseed cakes have not given successful results, Pettit *et al.* (1944), Frolich (1952). Due to the lack of sufficient knowledge about the toxic substances present in cottonseed cake, this valuable source of vegetable protein remained untapped for a long time. Considerable data are now available with respect to the usefulness of cottonseed cake proteins, if used properly in the diet of poultry. A number of workers such as Morrison (1913), Thompson (1926-1930), Kempster (1929-1930) and Morgan (1921), studied its use for egg production; but the results reported were variable. Heuser (1950) has pointed out that if cottonseed cake is to be used for laying hens, adjustment should be made with regard to mineral deficiency and also that it should replace only a part of the protein of the ration. Winter and Funk (1949) have, however, reported that cottonseed cake is a cheap and satisfactory protein feed for poultry in the cotton producing states. They are, however, of the view that it should be supplemented with animal protein, minerals and vitamins.

It is now a well known fact that the use of more than 5 to 6 per cent of cottonseed meal in rations for laying hens, results in the production of eggs which develop green and brown spots or discolouration of the yolks, when the eggs are stored for a few weeks. Recently great interest has been shown by workers such as Heywang *et al*, (1949, 1950 and 1952), Milligan *et al.* (1951), Altschul (1948), Ringrose *et al.* (1941), Eagle (1949) and Fletcher *et al.* (1953) on the part played by free and bound gossypol on the egg weight, hatchability, storage quality of eggs, nutritive value of cottonseed meal and the possible detoxification of gossypol. Therefore, the problem of the utilisation of cottonseed cake in the diet

of laying hens is confronted with many difficulties which require careful and coordinated studies over prolonged period and on a large number of birds.

Pakistan produces about 250,000 tons of whole pressed cottonseed cake. This is at present being entirely used as a concentrate for milch and draught cattle. The percentage of free gossypol in the Punjab cottonseed cakes (whole pressed) of good protein quality varies from .05 to 0.25 (Hussain and Saleem 1955). It was, therefore, considered that about 20.0 per cent cottonseed cake could be used in the diet of laying pullets. In the present studies, cottonseed cake (whole pressed) was used, with a view to study egg production in pullets, when the ration was provided with enough mineral matter from berseem hay meal and part of the protein from liquid butter milk.

Rhode Island pullets were used during these studies. Their individual egg production was recorded daily. The mash (Table 1) was fed to all the pullets twice a day, 9:30 a.m. and 3:30 p.m. at a rate of 2 oz. per bird each time.

In the morning during summer ½ oz. of green vegetable waste and during winter ½ oz. of green berseem was fed per bird. ½ oz. onion waste was also fed daily in the evenings per bird. Immediately after the mash was placed in the feeding troughs before the birds, buttermilk (dry matter 5%) at a rate of 200 gms. per bird per day was given. Grit was kept in containers to be taken at will. The birds had access to plenty sun-shine during winter and shade during summer months.

About 2-4 hours before feeding, wheat crumbs and cottonseed cake were soaked in the requisite quantity of water, containing about 0.5 per cent common salt. At the time of making the mash berseem hay meal and dry cow manure were spread on the mash and then well mixed up. The requisite quantity of powdered limestone was also added at the same time.

The chemical composition of the feeds and their percentage in the diet used in these studies is presented in table 1.

The chemical composition data show that dry wheat crumbs contain a greater percentage of protein, calcium and phosphorus than maize. Since dry wheat crumbs are cheaper than grains such as wheat, mamni, maize or jawar, wherever possible dry wheat crumbs should be used in the ration of layers. Since cottonseed cake is available throughout the year, even in the villages, therefore, its utilisation in the rations of

TABLE 1

Chemical composition of Feeds and the Ration.

Feed	% of diet	Dry matter	Ash	Fat	Crude fibre	Protein	Nitrogen free extract	Calcium	Phosphorus
Dried wheat crumbs (chapati waste)	55.0	92.0	1.7	1.8	1.0	10.5	77.0	0.08	0.60
Cottonseed cake (whole pressed)	20.0	92.5	6.0	8.5	22.3	22.1	33.6	0.18	0.52
Berseem hay meal (Trifolium alexandrium)	15.0	90.5	12.9	1.2	27.7	13.0	35.5	1.70	0.33
Dried cow manure	2.5	95.0	13.6	1.5	31.1	7.6	41.2	0.64	0.52
Buttermilk	5.0	10.7	0.7	0.1	—	5.8	4.1	0.21	0.09
Limestone	2.5	100.0	—	—	—	—	—	38.0	—
Sodium chloride	0.5	—	—	—	—	—	—	—	—
	100.0	—	—	3.03	9.94	15.04	—	1.87	0.54
Composition on whole diet									

poultry will not present any difficulty as against meat scrap or fish meal which are either unavailable or if available, are more expensive. As the protein quality, thiamine and free gosypol content of the cakes vary from place to place, therefore, it may not be possible to use all types of cottonseed cakes produced in Pakistan efficently for egg production and may result in eggs which may have poor storage quality and low hatchability. Further studies are, therefore, necessary to verify the value of different type of cottonseed cakes produced in the Pakistan.

Berseem hay meal is a good source of calcium vitamins and certain other dietary factors; but it has so far not been largely used in the rations of poultry during summer. The vitamin contents have not been determined and will be presented in a later publication. It can, however, be said with a certain amount of assurance that every poultry ration should contain a small proportion of berseem hay meal. The supply of berseem hay meal does not present any problem, because it can easily be chopped to ½" pieces and then dried, and stored in a dark cool place for subsequent use throughout summer and winter.

The dry cow's manure has been included in the diet with

a view to provide vitamin B_{12}. It has also been reported by Hammond (1942) that it can serve as a partial substitute for alfalfa meal. The chemical composition data show that it is also a good source of calcium and phosphorus but is high in crude fibre. The buttermilk used during these investigations was of buffalo's milk with 5.8% protein and was fed all the year round. The birds greatly relished the liquid and remained near and at the cups till it was entirely consumed. It also proved to be laxative for the birds.

RESULTS

In the present studies the egg production has been about 170-180 per year in the case of Rhode Island Reds. The fact that the birds relished the mash and consumed it within a few minutes of placing the feed before the birds, indicates that the feed was well utilised by the birds.

Cottonseed cake unfortunately contains a toxic substance —"gossypol", which if present in the free state interferes with the growth of non-ruminants. Poultry has given good responses to cottonseed cake feeding; but suffers from the defect that the eggs from the hens fed on cottonseed cake become discoloured if kept for a few weeks in the cold storage. Heuser (1950) has stated that if cottonseed cake is used in laying rations adjustment should be made for its mineral deficiency. It is also advisable to use it only as a part of the protein rich feed and not to substitute it entirely for meat scraps or buttermilk. The data on storage quality of eggs have shown that the eggs produced by the hens on rations containing 20% cottonseed cake can safely be stored for about 30 days during winter months without any yolk discolouration. Storage of eggs in Pakistan is not an acute problem. In fact very few eggs are stored. Since the eggs on ration containing cottonseed cake do produce discolouration when stored over prolonged periods, therefore, it is advisable that the eggs should be consumed fresh. The yolk discolouration data of the 100 eggs stored is given in the following table.

YOLK DISCOLOURATION DATA

Days of storage	
7	No spots.
14	No spots.
21	No spots.
28	No spots.
35	Yolk 25 to 50% discoloured.
42	Yolk 25 to 75% discoloured.
48	Yolk 50 to 75% discoloured.

(a) It was noticed that if old cottonseed cake was used, the yolk discolouration was comparatively less.

(b) No pink colouration was noticed in the whites of the stored eggs.

One of the most serious objections to feeding cottonseed cake is for breeding hens. It is known that feeding of cottonseed cake lowers the hatchability. This does not present a serious problem because if the eggs are to be used for hatching purposes, cottonseed cake could be omitted or reduced considerably and be replaced by about 10% fish meal. Detailed experiment in respect of the hatchability of eggs on this ration have not so far been conducted. However, small scale experiments have shown that 60-65% hatchability can be obtained on this ration. This performance is by no means encouraging, but could be improved after further research and experimentation on the toxicity of free gossypol.

SUMMARY

Results on the use of whole pressed cottonseed cake, berseem hay meal, dry wheat crumbs (chapati waste) and buttermilk in the ration of laying pullets are reported. Production of 170-180 eggs per bird (Rhode Island Red) per year was obtained. Good egg production was obtained even when the crude fibre of the ration was as high as 9.9%.

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THE SAFE, ECONOMICAL AND PRACTICAL DESTRUCTION OF *ARGAS PERSICUS*, FOWL TICK, TAMPAN, BLUE "BUG", CHICKEN TICK OR ABODE TICK.

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The old, wooden arks were kept empty for a period of nine (9) months. Regularly every month, the arks were well sprayed with most of the known poisons, effective for this vile parasite.

After this period of nine (9) months, the young pullets were housed in these arks which, we were sure, were Tampan free.

It, however, only took three (3) days before a great amount of green diarrhoea was noticed on the manure trays. The pullets showed a very noticeable weakness and ruffled feathers.

Immediately all arks, tree trunks and fence poles were again sprayed—this time with a 50% wettable DDT powder. All mash troughs and drinkers were sprayed—great care being taken to prevent the 50% DDT to mix with the mash or water.

The results, the next day, were most pleasing. Thousands upon thousands of fully-grown Argas Persicus littered the ground—dead.

Our findings are that the spraying for nine (9) months, in the absence of poultry, were absolutely useless because the Argas Persicus were well hidden, deep in the multitude of cracks in the woodwork. As there were no chickens for them to feed on, they did not leave their hiding-places to pass over the DDT. As soon as chickens were, however, placed in the arks, the Tampans had a meal for the first time in nine (9)

months. The birds became infected, either with Borrelia Gallinarum or suffered as a result of emaciation and weakness. The fresh 50% wettable DDT, however, stopped their destruction abruptly. At weekly intervals, we repeated the spraying of 50% DDT for five weeks and from then on sprayed once a month.

Absolutely no ill-effect as a result of DDT poisoning, (rapid breathing through the mouth, blinking of eyelids, dyspnoea, no cordination, death) was noticed. Although an extremely strong emultion in water was used, the DDT stuck to the surface after drying and the poultry either did not notice it or were not interested in it.

No Tampan-infected-material should be moved because of the danger of spreading this vile parasite. To burn badly-infected, cheap houses on the spot, is still the best way of destroying the parasite and getting rid of a badly constructed danger.

Two live Tampans amongst the skins of hundreds of dead ones. These two tampans have not had a meal for 2 years.

EGG AND CHICKEN—MEAT PRODUCTION GOALS FOR EGYPT*

MORLEY A. JULL, U.S.O.M., CAIRO, EGYPT

The fact that for several years the human population of Egypt has been increasing faster than the production of many animal-food products increases the urgency of developing more efficient food-producing strains of the various classes of livestock, including poultry, as quickly as possible.

The protein in eggs and poultry meat contain essential amino acids not found in cereal grains, fruits, and vegetables, which constitute by far the major portion of all diets in Egypt. Eggs and poultry meat, therefore, serve a very important part in providing Egyptians with well balanced diets.

EGG PRODUCTION

Not only has Egypt for several years ceased to export eggs but the per capita-consumption, which has always been considerably lower than in such countries as Denmark, England, and the United States, has been declining steadily.

The development of sound breeding plans to increase the laying ability of Egyptian flocks should be the first objective in a nation-wide attempt to provide Egyptian families with the eggs they need.

*(A talk given at a meeting of The Animal Production Society, Cairo, Egypt)

Good nutrition, proper housing, and efficient flock management are very important in order that the birds may lay at their maximum inherent capacity. Since the laying-cage system is used in Alabama and Southern California, where the weather is often quite warm, it is suggested that experimental tests be conducted in Egypt to determine whether or not this system is feasible. Experiments should also be conducted to determine the most suitable types of roofing material and the best methods of providing ventilation for laying houses in order that satisfactory egg production may be maintained throughout the summer months. Egyptian poultrymen should always keep in mind that at 80°F layers begin to suffer, at 90°F egg production is affected, and at 100°F there is almost certain to be some mortality.

Progeny testing to develop high-laying strains is absolutely necessary because egg production is not a highly heritable trait. Age at sexual maturity, rate of laying, and persistence of production are the three most important traits

that determine the total first-year egg production of a bird. The goal should be to develop strains of birds that will produce a dozen eggs on the fewest possible pounds of feed.

For many years in several different countries, egg-laying tests have been carried on for the purpose of stimulating interest among poultry breeders in developing high-laying strains. The development of laying tests of some kind would be a desirable goal in Egypt, especially if they were along the lines of the Record of Performance plan or the Random Sample Tests carried on in the United States.

For about the past 20 years, the United States Department of Agriculture has cooperated with state poultry authorities in carrying on a Record of Performance breeding program. During the 10-year period from the 1944-45 laying year to the 1954-55 laying year, there were 18 poultry breeders who participated in all ten laying years. The average egg production of their birds increased from 186 to 219 eggs, which represents an increase of a little over three eggs per bird per year. White Leghorns and Rhode Island Reds led all other breeds. Since part of this increase could have been the result of improved diets and better management, it could be concluded that the genetic gains were of a relatively low order. On the other hand, 33 eggs per bird increase in 10 years is quite an achievement.

Some poultry breeders in the United States have made remarkable progress during the past few years in developing high-laying strains. The results secured by two outstanding poultry breeders are cited as an inspiration to poultry authorities and breeders in Egypt. Last year a White Leghorn breeder entered 9,999 birds in the Record of Performance program, 6432 of which qualified for ROP and their average egg production was 245, a remarkable record. His birds consumed about 4.5 pounds of feed per dozen eggs produced. Another White Leghorn breeder participated in the New York random sample test for three successive years and on the basis of egg production to 500 days of age his birds laid an average of 225.7 eggs per bird per year, also a remarkable record. His birds consumed only about 5.2 pounds of feed per dozen eggs produced. By contrast, most of Egyptian laying flocks consume about 7 pounds of feed per dozen eggs produced and most of the eggs produced by the native breeds are relatively small in size.

May the results secured by the two outstanding breeders cited previously be an inspiration to poultry leaders in Egypt

to develop sound breeding programs for poultry breeders in order that egg production may be profitable to them and that consumers may be provided with an adequate supply of eggs to improve their diets.

CHICKEN MEAT PRODUCTION

From the standpoint of the efficiency of converting feed into poultry meat, broilers exceed fryers and roasters. Rate of growth and consequently body size in chickens are highly heritable. This means that selection for improvement is best based on individual selection rather than on the basis of family selection or sib testing.

Broilers consume a smaller quantity of feed per unit of gain in body weight than any other meat-producing animal. Turkeys consume more feed per pound of gain in body weight than hogs but turkeys produce protein more economically. Beef cattle consume more feed units per unit of red meat produced than any other class of livestock.

Officials of the United States Department of Agriculture have said that last year a man had to work 63 hours to produce 100 dollars worth of tobacco, 53 hours to produce 100 dollars worth of milk, 18 hours to produce 100 dollars worth of hogs, and 13 hours to produce 100 dollars worth of broilers.

In the United States, for the broiler industry as a whole, in 1946 about 4 pounds of feed were consumed per pound of broiler produced whereas in 1955 about 2.5 pounds of feed were consumed per pound of broiler produced. This remarkable improvement represents a 31 percent saving in feed costs. The broilers produced in 1955 were sold at a relatively younger age and were smaller size than in 1946. Over the years, better bred birds, improved diets, and more efficient management had a marked increase in the efficiency of feed utilization in broiler production.

The most remarkable example of efficiency in broiler production has recently been obtained by the poultry department of the University of Maryland: 3-pound birds at 8 weeks of age on 1.96 pounds of feed per pound of broiler. The diet contained 12 percent of fat.

At any rate, the fact that such remarkable results have been secured presents a new goal for broiler producers everywhere. This latest achievement in efficient chicken-meat production was made possible with a strain of birds especially bred for rapid growth. Most of the broilers produced in the

United States are early-feathering birds with white plumage.

As the demand for broilers in Egypt increases, more and more attention should be given to broiler management methods, especially nutrition and housing. The most suitable type of housing for broilers needs to be investigated, especially in view of the rather long spells of hot weather that sometimes pevail. Raising broilers in batteries is probably unwarranted because of the cost of the different sizes of batteries needed and because of the labor involved in feeding large number of birds in batteries as compared with broilers raised on the floor in typical broiler houses. The most suitable types of housing for raising broilers in confinement needs to be investigated.

DANISH GOVERNMENT POULTRY BREEDING CENTERS

Denmark has a very large number of poultry in relation to the size of the country, mostly in rather small flocks. Fowls are kept on every farm in Denmark and poultry production is of great economic importance, particularly on the smaller holdings.

From Denmark's 300,000 flocks of poultry, the National Committee for Poultry Breeding has approved 80 breeding centres, each representing one of the following breeds: White Leghorns, Brown Leghorns, Rhode Island Reds, Light Sussex, White Wyandottes, and Barred Plymouth Rocks.

At the breeding centers, the breeding stock is multiplied by pen mating. All chicks hatched from the breeding pens are hatched separately and wing-banded to ascertain their pedigree. All breeding centres must be approved and supervised by the National Committee for Poultry Breeding to ensure that only vigorous high-producing breeding stock of good standard qualifications is selected for the breeding pens.

Breeding is mainly carried out at the approved breeding centres, selected in a national contest. Breeding centres must keep only one breed and the breeding stock must consist of

birds that will produce a vigorous, high-yielding progeny of good breed characteristics.

The laying birds are trap-nested the year round and the eggs of each bird are weighed regularly.

The National Committee approves the breeding stock, inspects the pens, the wing banding, the egg recording, and supervises the entire breeding practice at every centre.

The health of the birds at the breeding centres is under careful and comprehensive control. Only those flocks that have been certified as free from pullorum disease can be approved for entry at breeding centres. The birds must be tested for tuberculosis whenever the National Committee for Poultry Breeding considers it necessary. All breeding centres must notify the committee if disease occurs. The importance to the health of the birds at the breeding centres, the long-standing prohibition of egg imports, and the very strict veterinary control on the import of live poultry has made Denmark free of serious poultry diseases.

"Favrholm", the Government Poultry Progeny Testing Station.

Progeny tests for cocks are conducted at Favrholm. The cock whose daughters are tested must comply with certain requirements of pedigree and body conformation. All sires are selected by The National Committee for Poultry Breeding. Every year 128 pens of 10 pullets each are tested. The 10 pullets in each pen are daughters of the same cock. Egg production, egg weight, and feed consumption are all recorded, and the cocks whose daughters attain a certain minimum standard are entered in the Official Pen Book for Cocks. (Register of Merit).

Denmark also has good breeding centres for ducks, geese, and turkeys. These, too, are selected and supervised by The National Committee for Poultry Breeding. The progeny of the best birds is hatched individually and wing-banded. The egg production and weight increase of each bird is recorded. This breeding practice has resulted in birds of good standard qualities and type that will lay well and produce table birds of excellent quality. Bronze turkeys, Embden, Danish Grey, and Italian Geese, and Aylesbury and Rouen ducks can be supplied from breeding centres.

THE RECENT PROGRESS OF POULTRY BREEDING IN AMERICA*

DON C. WARREN
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In the last few days I have had a wonderful chance to get acquainted with a large number of poultry people in Japan and to see a considerable number of your poultry people. We have enjoyed it thoroughly and one thing I want to do is to compliment the Japanese poultrymen for the fine job in husbandry that they are doing. I have seen a number of cases in your poultry plants and have noticed that you do an excellent job of husbandry.

I have seen at some of your egg laying tests I had reported to me, records that we in America would be envious of. In fact you are making in your egg laying tests at the present time much better records than we have ever been able to make in America.

I have been asked to speak on the future progress in poultry breeding. I would like to confine my statements to the future of poultry breeding in America because that is the thing I know most about. I could not predict too accurately what is to be the future for Japan.

In America we have been doing poultry breeding work only about 100 years. During the first 50 years it was the poultry fancier who was doing most of the poultry breeding. A few years later we began to trapnest poultry and in the first few years of that period we depended primarily on individual records.

In more recent years we have been using family breeding as a method of selection rather than individual records, and have made considerable progress. However, in more recent years our people have been very much dissatisfied with the progress that we have been making and in fact many of our poultry breeders believe that in the last five or ten years that they have made very little progress in egg production.

In order to make progress we realize that we must exercise as much selection pressure as possible. In order to exercise the maximum amount of selection pressure we have decided that there are certain practices that we must follow in our poultry work.

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* Address given at a meeting in Tokyo held under the auspices of the Japan Branch of the World's Poultry Science Association, December 1st, 1955.

We have decided that these are some of the things that we must do in order to make greater progress in improving our poultry. And one of the first things is that we must keep the number of traits for which we select at a minimum.

I find that many poultry breeders do not recognize the importance of this factor because every time we add a new trait to the list of those for which we are selecting we must reduce the amount of pressure on other traits there are involved.

We have decided that we are going to put the selection pressure on those traits for which we are paid in our poultry breeding program. Now that brings up the problem of exhibition quality. For several years in America our most progressive poultry breeders are virtually ignoring exhibition quality.

It is a very easy matter to eliminate half of your breeding flock because they failed to reach a standard that you may have set up for exhibition quality, for instance, the mere fact that a Rhode Island Red has a few white feathers in it or that a White Leghorn has a little down between its toes or an extra sprig on its comb. Of course that may eliminate them from the show ring but it should not eliminate them from the breeding pen if you are breeding for production qualities or economic qualities and attempting to make progress along those lines.

Certainly we want our Rhode Island Reds to at least have a red color and look like Rhode Island Reds. We want our White Leghorns to look like White Leghorns and on down the line of breeds that we are using, but to require too much precision regarding the exhibition quality is likely to hold back our program in attempting to improve the economic qualities of our stock.

As another future breeding practice we have decided that we must use increasing numbers of pullets in our breeding flock. We have had many people in the past, I mean poultry breeders in America and elsewhere, who have strongly been against the idea of using pullet breeders. We know that the period between generations influences the progress that is made and if we wait and use only the birds that have had a year's record we have slowed down the progress of our breeding accomplishment so that in America we are increasing the use of the pullet. I know that we will find many Europeans and perhaps many of your people will not agree with us but we are rapidly going in the direction of pullet breeding

in America. I would say that part of the ideal would be, to have in any set of breeding pens that you may carry, that virtually 80% of it should be pullets and not more than 20% cocks and hens.

Another practice that we are following is that we avoid inbreeding in so far as possible. Now a certain amount of inbreeding may be necessary to fix a certain trait, but in general we consider it unnecessary to do close inbreeding unless you have a program of inbreeding for a specific purpose. Otherwise, we would keep our inbreeding down to a minimum, certainly seldom mating closer relatives than half brothers and sisters and very seldom would we mate full brothers or sisters.

Although we strongly recommend the progeny test, in more recent years we have been inclined to restrict its use to certain types of traits. We did not recognize that a few years ago and are attempting to apply progeny tests to all types of traits.

In order to discuss this further, I would cite certain places where we would use the progeny tests and where we would not. We do use the progeny test and recommend it strongly for those traits that have what we call low heritability or in other words those traits that are considerably influenced by the environment. Now, two rather important economical traits for which we believe that the progeny tests should be used exclusively are egg production and liveability or viability of the adult bird.

Two other traits that have what we call high heritability are egg size, and rate of growth. Now each of these can probably be improved to much advantage by using individual selection rather than using the progeny test.

So, if one were carrying out a breeding program including these four traits, we would use the progeny test exclusively to breed for egg production and for ability to live during the first laying year. If you are going to combine the progeny test along with individual selection for egg size and rate of growth, then you have to include enough families in order to have some spare birds. After you have selected the families that you are going to use have a point at which you will cull in those families for egg size and for rate of growth.

Of course in the short period we have, it is impossible to detail to you how you will carry out any selection program. But the important thing that I want to emphasize here is that it is desirable to use individual selection for certain types

of traits, the two that I have mentioned.

Now my discussion so far would apply to methods of breeding where we are using of course family and individual selection. I now want to go into a brief discussion of certain other techniques that are being used in America and that will be used in the future.

One new method of breeding that we are using in America and will continue to use, I think in the future, is inbreeding and hybridization, concerning which you have already heard I believe.

Some of our hybrid poultry have been criticized by a good many of our poultrymen and many of them have predicted that hybrid poultry is not likely to be maintained in the United States for a very long period.

Unfortunately, the production of hybrid poultry is a very costly procedure. And must be carried out by large corporations. At the present time only about 10% of our poultry is of the hybrid type. I think undoubtedly, the production and use of hybrid poultry is going to be a permanent thing in the poultry industry of America.

There are certain other types of breeding or systems of mating that have been giving the hybrid poultry considerable competition. A type of poultry breeding, another system of mating, that is offering hybrid poultry competition in America is strain crossing, that is where you simply take two strains of the same breed and cross them and sell the process as a product.

I do not mean to imply that all strain crosses are superior because some strain crosses do not give superior performance. The way that strain crosses, that have been used in America, have been found is for a breeder, who has a strain of his own which he has been using for a number of years, to bring in a large number of other strains to his farm and mate the males of those strains to the females of his own strain. By extensive tests such as this, some of our commercial breeders have found strain combinations that have given very superior performance.

After they have found a strain, the males of which will give superior results and cross with their females, then of course they use it as their commercial stock that they sell to people for use in egg production.

Of course there are certain problems involved in this sort of system because if the man from whom you get the strain (the male to cross on your strain of females) should change

his stock sometime in the future, then all of your testing has gone for nothing and probably you will have to find a new combination. So usually, what they do is to import a considerable number or start a flock of their own to make sure that they have a constant source of males.

Now, one step further that some of our people have taken. When you find for instance two strains that seem to combine well and mate well, it must mean that they have a genetic constitution that causes that good combination. Now the next step in breeding that has been taken up by some of our more progressive people is carrying out a selective program with the objective of improving this combinability or matability or what you want to call it.

Now this selection for improved combinability between two stocks, is known as reciprocal recurrent selection. You may have seen it in the literature. It is a rather bad name but it is merely selection for combinability.

Now the mechanics of this sort of selection is rather involved and I will not attempt to go into it further than to say that, you have two populations, two strains it may be, two strains of poultry we will say of the same breed. You have strain A and strain B. Now what you do is to maintain each of these pure, generation after generation, but in every other generation what you do is to test the males of A and the females of A by crossing them to B, and of course at the same time you will test the sires and dams in the B flock by mating to A. Now the thing that is unusual about this selection system is that you select your future breeders in strain A not on their individual performance, that is egg production or things of that sort or hatchability, but on the performance of their crossbred offspring.

By several generations of selection such as this, it is hoped that in the end there are obtained two flocks or two strains that will have improved combinability or that they will get even better results than they got originally from crossing these two strains.

Turning now to some of the other future developments in poultry breeding I might say that in America at least we have decided that we are going to concentrate on a very few breeds of poultry.

In America for the past 25 or 30 years we have had a national plan of poultry breeding. I might say, that I want to emphasize the fact that we are radically changing that national plan of breeding. In the first 15 or 20 years it was

of great deal of value to us in our poultry breeding program. However, in the past 10 years I think our national plan has been handicapped. I find in this area of the world some people are copying our national plan of breeding and if you are considering any thing of that sort you should be aware of the fact that we are radically remodelling our national plan in America. The main feature which we are changing is that we are not telling people how to breed poultry. We are using our random sample tests as a method of measuring what has been accomplished and letting the poultry breeder carry out his breeding procedure as he likes.

The problem that has occurred in recent years is, that it is virtually impossible to have any national plan of breeding, that attempts to tell how to breed that will cover all of these new systems of breeding. You can not get any one national plan that will cover a system of breeding using family selection and at the same time covering a system where you are using inbreeding, any hybridization or strain crosses, or things of that sort, that is, a plan where you attempt to tell how to breed will not fit all these new systems of breeding.

Another step in the future development of the poultry industry in America is, that, in the next few years we will no longer have any regular standard egg laying tests. Their place will be taken by random sample tests.

Another development in the poultry industry of America that I want to mention briefly is, that we have decided in America that we will not have dual purpose breeding.

In the near future we will have two kinds of chickens in America, one will be the table chicken or the broiler, which will be white, which will have rapid growth and rapid feathering and will probably have large adult size.

Our egg producer of the future will be a small white bird, probably considerably smaller than our present day White Leghorn. It will probably be the smallest possible bird that is capable of laying a standard size egg.

This gives you some idea of what we are thinking about in America. Not all the predictions that I have made may come true, but I think that they do give you some idea of what the trends are.

I want to make one final statement that comes from observations that I have made in travelling through this portion of the World. This statement is that I find a good many (not necessarily in Japan but in this part of the world) people depend upon the Government to do many things for them.

They expect the Government to do their breeding work, distribute their poultry and everything else. I want to make this final statement, that, I know of no economic breed at the present time that was ever produced by a Governmental Agency. All the valuable breeds of poultry have come from the efforts of independent breeders and I believe that we must look to the independent breeders for the source of our future poultry stock.

EARLY RECORDS OF HISTORICAL INTEREST

MORLEY A. JULL
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The practice of force-feeding (noodling) of geese in parts of France and Germany has been known to have been practiced for many years for the purpose of producing enlarged livers, from which the delicacy "pâte de fois gras" is made. Very few people realize, however, that the practice was engaged in by the ancient people of Egypt some 3,000 to 5,000 years ago. In her book "The Splendour That Was Egypt," Margaret A. Murray gives the following account of the livestock in ancient Egypt. "The farm animals of the ancient Egyptians were cattle, sheep, goats, antelopes (especially oryxes), and pigs; in the old Kingdom hyenas. Birds bred for the table were geese, ducks of various kinds, cranes and pigeons. The birds were fattened by having the food put down their throats, so also were some of the animals."

In the same book, it is recorded that during the eighteenth dynasty and the reign of Thothmes III, the greatest Pharaoh that Egypt ever had, he kept hens and that two of them laid every day. How that fact was established is not stated.

DIFFERENTIAL DIAGNOSIS AND CONTROL OF RESPIRATORY DISEASE IN THE FIELD*

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Not only are there at least 10 quite distinct diseases which commonly give rise to respiratory symptoms in poultry, but symptoms are common to several diseases while more than one respiratory disease may co-exist in the same bird or in the same flock. Nevertheless if the fullest advantage is to be taken of recent advances in the control of these diseases by biological products or chemotherapeutics, then some effort must be made to differentiate the conditions with a reasonable degree of accuracy.

Unfortunately many of these diseases can only be differentiated by laborious and time-consuming laboratory techniques, and the time lag resulting often renders the diagnosis more of academic interest than of practical value to the farmer, whose main concern is not to establish a diagnosis but to control his losses.

An attempt has been made to summarise in chart form the salient features of these diseases. It must be borne in mind, however, that this chart is little more than a guide and suffers from the usual pitfalls and inaccuracies resulting from over-simplification. For a more detailed description of respiratory disease reference should be made to a paper by Wilson (1954) presented to the FAO Conference in Paris and re-published in THE VETERINARY RECORD; for more recent work, particularly on C.R.D. to the Proceedings of the 80th, 90th, and 91st Annual Meetings of the A.V.M.A. (1952, 1953, and 1954), and to the paper by Chu (1954) in the Proceedings of the 10th World's Poultry Congress. The therapeutic control of respiratory diseases was adequately dealt with by Blount (1955). Newcastle disease and its differential diagnosis has been reviewed by Beaudette (1943, 1950).

SUMMARY

I apologise for the superficial way in which I have dealt with the differential field diagnosis of respiratory diseases, but I am sure you will appreciate that the multiplicity of conditions all giving rise to almost similar symptoms presents a nearly insuperable problem for the routine laboratory worker or field adviser. Whereas certain diseases such as gapes,

*Excerpts from Veterinary Record. 68: 547. 1956.

THE DIFFERENTIAL DIAGNOSIS OF AVIAN RESPIRATORY DISEASES

Cause	Name	Age	Incubation period	Duration	Spread	Mortality	Nasal discharge	Facial swelling
I. Virus	1. Fowl pox	All ages, mainly adults	7-14 days	3-4 weeks	Slow	Variable but low 0-30%	In oculo-nasal form	Rare
	2. Infectious laryngo-tracheitis	Growers and adults	4-21 days	*2-3 weeks	*Rapid	*High, 30-90%	None	None
				†Months	†Slow	†Low, 5-10%		
	3. Newcastle disease	All ages	5-7 days	*Few days	*Rapid	*High, 100%	Slight	None
				†Week or so in field	†Rapid	†High in chicks, 10-60%. Low or nil in adults		
	4. Infectious bronchitis	Chicks and adults	18-24 hours	5-21 days	Rapid	Chicks high, 60%. Adults low or nil	Slight in chicks only	None
II. Bacterial	1. Infectious coryza *(Haemophilus gallinarium)*	Growers and adults	24-48 hours	10-14 days	Rapid	Slight, 0-10%	Profuse	Slight to severe
	2. Chronic respiratory disease (P.P.L.O.)	Growers mainly	10-20 days	Months	Slow	Variable to high, 10-50%	Profuse	Slight to severe
	3. Infectious sinusitis (P.P.L.O.)	Turkeys all ages	2-4 days	Weeks to months	Rapid	Variable	Profuse	Severe
	4. Pullorum disease *(S. pullorum)*	Chick	3-5 days	Few days	Rapid	Usually high, 20-60%	No	No
	5. Fowl cholera *(P. avisepticus)*	Adults and turkeys	2-3 days	*Few days	*Rapid	*High, 80%	Unusual	*No
				†Months	†Slow	†Low, 5%		†Swollen wattles
III. Fungal	Aspergillosis	Chick	2-4 days	Months	Rapid	Variable to high, 10-50%	No	No
IV. Nutritional	Avitaminosis "A" (nutritional group)	Growers	—	—	—	Usually low, 5-10%	Yes	Yes

(Table continued on pages 326-327)

†Chronic *Acute

paralysis, aspergillosis, pullorum disease, cholera, fowl pox, and in certain instances infectious laryngotracheitis can be fairly readily differentiated, others of far greater importance such as Newcastle disease, infectious bronchitis, infectious coryza, and C.R.D. remain a very confused issue, unless facilities are available for the diagnostic techniques referred to. Unfortunately, as I have indicated, most of these techniques are too laborious for the routine worker and frequently too time-consuming to be of practical value to the stock owner. Probably in most instances the best procedure is to regard all outbreaks accompanied by respiratory symptoms as potential Newcastle disease and having eliminated that condition to proceed step by step either by laboratory methods or by field trials. At least by *post-mortem* examination alone, one can eliminate paralysis and *Syngamus* and by cultural methods *pullorum* disease, cholera, and aspergillosis. The diagnosis of both pox and tracheitis by direct transmission is relatively simple, but having eliminated those and Newcastle disease one is still left with the often nearly insoluble problem of the accurate differentiation of infectious coryza, C.R.D., and infectious bronchitis. Therapy trials on small groups can occasionally give a helpful lead since only coryza responds to sulphonamides, while C.R.D. and bronchitis may possibly be differentiated on the clinical evidence. The position, however, is far from satisfactory.

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WANTED

Inquiries for the proceedings of the following World's Poultry Congress have been received:

Holland—1921
Spain—1924
Italy—1933
Germany—1936
France—1951

Most of these requests come from libraries. If any person has any of these Proceedings and would care to dispose of them please notify Dr. G. F. Heuser, Rice Hall, Ithaca, N. Y., U.S.A.

WORLD'S POULTRY SCIENCE LIBRARY

Reviewer:

W. D. TERMOHLEN
American Embassy
APO 500, c/o Postmaster
San Francisco, California, U.S.A.

KEEPING CHICKENS IN CAGES, R. C. Hartman and Dale F. King. 4th Edition. Roland C. Hartman, Publisher, Redland, California, 1956. 304 pp., price $5.00

The authors, in their Preface, said they wrote this book to provide a practical working manual and guide for keeping layers in individual cages. It is proper to spell the word PRACTICAL in capital letters because the material presented in the book is based principally on information obtained from visits to hundreds of cage poultrymen and the practical experience and pioneer research of Dr. King, the junior author who joined the senior author in the preparation of this fourth edition. This is an excellent combination of authors which in itself recommends the book to operators of the cage system, to students and makes it a must to anyone newly engaged in the operation of an individual cage system egg laying farm. Because this book is based so largely on practical experience there are no reference lists at the end of chapters or the end of the book. To those who so often measure a book by the number of reference citations this will be a disappointment. However, once read the realization should come that this whole book is page after page a reference—a practical, useful easy to read and easy to understand book which needs no reference list.

In 1950 when the first edition of this book was published by Roland Hartman, even he did not realize how rapidly this system would spread around the world not only in warm climate but also would be adapted to cold climate.

The first chapter "The Individual Cage System" starts the reader off with a feeling of interest since it briefly covers the history of the single deck individual cage system, the thirteen advantages and four disadvantages of the system, answers the question Where will cages work? and ends with information on cost and income studies.

Chapter II gives sound and sensible information about the factors to consider for persons thinking about going into the cage system. From there on the other 15 chapters get right into the business of setting up and operating a laying cage system.

The authors do not claim individual cages are the only system for management of layers for commercial egg production. They very candidly and sensibly state it may work successfully for some, but not for others. The authors are to be congratulated for attaining their objective that this book would provide a rich source of ideas for the practical cage poultryman and for the student who might be interested in this method of poultry housing and management—Orchids to you Messrs. Hartman and King.

MODERN POULTRY FARMING, L. M. Hurd, 4th Edition, The MacMillan Company, New York, 1956, pp 575. Price $7.50

Twenty-eight years ago, after 13 years of association with Cornell University, Louis M. Hurd wrote and there was published the first edition of this work then under the title Practical Poultry Farming. Now Emeritus Professor in the Poultry Husbandry Department of Cornell University after many years of teaching, research experience and plus many years as a poultry owner practicing what he taught and preached, Prof. Hurd has completely revised his book to make this new edition a useful up-to-date guide for poultry keepers.

The 22 chapters and appendix cover all phases of the business of poultry-keeping from the starting of a poultry business through the marketing. The second chapter of the book covers investment, returns and expenses in poultry farming in a really down to earth manner. The third chapter—"Starting a Poultry Enterprise" shows the sound, practical sense and experience of the author from the first sentence, "It is generally considered that the best way to start a poultry enterprise is to begin modestly and let the business build its increases", to the last sentence, "Every effort should be made in the arrangement of the place to save time, labor and travel". While he judiciously avoids suggesting any breed as the best under the chapter "Choosing a Breed", Mr. Hurd does set forth sound principles. His conservativeness and caution becomes evident in his statement regarding "incrossbred" or hybrid chickens in which interest has increased in recent years and which are raised by poultry keepers for both egg and meat production, "However, not enough scientific evidence is available at present to show any sustained superiority of hybrid chickens over well-bred strains of purebred stock when kept on well-managed commercial poultry farms."

Housing, hatching, rearing, feeding, disease control, marketing, breeding of chickens, are quite fully covered. Turkeys,

guinea fowls, peafowls, ducks, geese, swans, pigeons and pheasants are touched on in four chapters covering 66 pages of the book.

Written principally as a practical guide for both the small or large poultry-keepers and for those interested in starting a poultry enterprise, it also has value to the teacher and the person serving the poultry industry in one capacity or another.

Certainly a book which would be a good investment for a person considering entering into the poultry business.

SO YOU'RE THINKING OF RAISING CHICKENS—BROILERS—TURKEYS. A. W. Jasper. The Mounder Press, Mount Morris, Illinois, 1956, 33 pp. Price $1.00.

There is a saying "Good Things Come in Small Packages". For the person who is thinking of going into the poultry business this book, while small in size, is packed with good advice. If this book was made a must for everyone thinking about raising chickens for eggs or broilers or raising turkeys there would probably be less unhappy people in this world. In a very concentrated easy to read way it puts together what the person dreaming about retiring to the small place in the country or the young person bitten by the poultry bug should read before taking the leap. "Let's face it—you either like chickens, or you don't". "It's the *man* in *management* that makes the difference". "A poultryman should have good health". "Get some practical experience before sinking your bankroll in poultry". "Consider carefully whether it should be eggs, broilers or turkeys". "Location—market key factor". "Water supply essential". "Zoning laws—in some instances rezoning has forced a poultryman to give up his farm". "Capital requirements and production costs". "Sources of credit". "Where to get help". These are just a few of the gems and highlights of this small book. This book does not cover production. It is a book worth its weight in gold for the person thinking about going into the poultry business.

POULTRY SCIENCE AND PRACTICE, A. R. Winter and E. M. Funk, 4th Edition, J. G. Lippincott Company, New York, 1955, pp 662. $6.50.

A book of 662 pages packed with practical understandable facts and reference material for the practical poultry person or the teacher for class work. Written by two men who have earned their prominent position as heads of poultry departments at two outstanding universities not only by their teaching and research ability but by their practical sense as

well. The book is time tested by 15 years since the first edition appeared in 1941. The book is brought up to date with recent references listed at the end of each chapter.

The authors have stated in the preface that the purpose of the book is to give what appears at the present time the practical factual information on general poultry production. They have carried out their purpose in a very admirable way. While the book is written for use as a general college poultry course, it will be very useful as a reference for anyone engaged in any phase of the poultry industry.

The eighteen chapters cover all phases of the poultry industry including breeding, incubation, housing, rearing, feeding, disease and parasite prevention and control, marketing and management. Chickens receive the major attention but turkeys, ducks, geese and miscellaneous poultry are also given good attention. A 32-page chapter on game bird production is a real gem in the book.

The appendix is packed with concise and useful reference material on breed and variety characteristics, composition of feedstuffs, and digestibility of poultry feetstuffs by chickens.

A recommended book worth the price.

A COCCIDIOSIS CONTROL?

A combination aueromycin-sulfamethazine treatment has proved 100 percent effective in preventing mortality of chicks with cecal coccidiosis under experimental conditions, according to USDA parasitologists.

Sulfamethazine controls the coccidial organisms. The antibiotic aueromycin stimulates chicks growth above normal despite the presence of pathogenic organisms. Best experimental results were obtaned from feeding 100 grams (roughly 3½ onces) of aueromycin per ton of feed with 0.125 percent sulfamethazine. The aueromycin-sulfamethazine treament must be started when chicks are exposed to infection. No deaths occurred in chicks given this treament, compared with a mortality rate of 43 percent in the inoculated, untreated group. Inoculated, treated chicks made better gains than healthy, untreated chicks.

These studies at the Agricultural Research Center, Beltsville, Md., showed that aueromycin helped chicks by stimulating their metabolism. Effects on the coccidial organism were not observed by the scientists.

(Agriculural Research, November, 1956. U.S. Dept. Agr.—Washington, D. C.)

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne

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GENETICS

ALLEN, C. J. (Michigan State U., East Lansing), and **L. R. CHAMPION.** COMPETITIVE FERTILIZATION IN THE FOWL. *Poultry Sci. 34(6):* 1332-1242. 1955.—A series of 7 experimental matings were conducted to test whether the spermatozoa from more nearly related individuals showed a special affinity for the ova of that breed. In matings designed to give genetic differentiation of resulting progeny equal concentrations of spermatozoa from each of several males were pooled, thoroughly mixed and inseminated into females. Data are presented on the following: semen volumes (cc), spermatozoa concentrations (millions per cu mm), motility ratings and percentages of defective spermatozoa. Further, correlation coefficients between motility rating and numbers of progeny, percentage of defective spermatozoa and fertilizing capacity and motility rating and percentage of abnormal spermatozoa were given. Affinity of spermatozoa from males of a particular breed for ova produced by females of the same breed did not occur in the breeds and strains of chickens used in this study. A type of selectivity based upon spermatozoa possessing certain advantageous variations was suggested as occuring in competitive fertilization in the fowl.—*L. R. Champion.* (Biological Abstracts)

ALLEN, T. E., and **LIDIA W. BOBR.** (Poultry Res. Centre, Werribee, Australia.)
THE FERTILITY OF FOWL SPERMATOZOA IN GLYCEROL DILUENTS AFTER INTRAUTERINE INSEMINATION. *Poultry Sci. 34(5):* 1167-1169. 1955.—The technique of intrauterine insemination of the hen is described. Intrauterine insemination of semen containing 20% glycerol gave almost normal fertility whereas no fertile eggs were obtained after using the customary method (intravaginal) of artificial insemination. A brief discussion of results is given.—*T. E. Allen.* (Biological Abstracts)

BOGOLJUBSKII, S. I. 1952. Povysenie effektivnosti mezporodnogo skrescivanija v pticevodstve putem napravlennogo izmenenija haraktera dominirovanija.
INCREASING THE EFFECTIVENESS OF CROSSBREEDING IN POULTRY BY PLANNED CHANGING OF THE DOMINATING CHARACTER. *Trud. Puskin. nauc.-issled. Lab. Razvel. sel.-hoz. Zivotn.,* No. 5 : 60-67.

One of 2 groups of New Hampshire ♂♂ and White Leghorn ♀♀ was fed a ration rich in protein, had 1 ♂ to every 7 ♀♀, and the eggs were incubated at a temperature higher than was normal; the other group was fed a balanced diet, had 1 ♂ to every 11 ♀♀, and the eggs were incubated at a temperature lower than was normal. The chicks hatched were fed similar diets to their parents. The crossbred chicks from the first group resembled Leghorns, being early maturing, having

a strong constitution and a more intense pale-yellow colour than chicks in the second group, which resembled New Hampshires and had a less strong constitution and slower metabolic rate. It is suggested that intensity of pigmentation is related to the vitality of the chicks. Egg production was greater and the initial rate of growth more rapid in chicks of the first group. Live weights at various ages to 1 yr. 5 mths. are tabulated for the different groups. (Animal Breeding Abstracts)

BOGOLJUBSKII, S. I. 1952. Vlijanie zameny belka v inkubiruemyh jaicah na okrasku operenija kur i potomstva ih.
THE EFFECT OF EXCHANGING ALBUMEN IN INCUBATING EGGS ON THE PLUMAGE COLOUR OF FOWLS AND THEIR PROGENY. *Trud. Puskin. nauc.-issled. Lab Razved. sel.-hoz. Zivotn., No. 5:* 88-93.

In a series of experiments [full details of which are not given], albumen was transferred from eggs of Rhode Island Reds or a general utility breed [unspecified] to [White] Leghorn eggs. The live weight, development and egg production of the birds from treated eggs exceeded those of the controls. In 81 birds hatched from Leghorn eggs to which R.I.R. albumen was transferred, plumage colour was normal in the first 5 mths.; subsequently yellow markings developed on several feathers of 3 of the ♂♂. The markings were less in extent and less pronounced than those of Leghorn×R.I.R. crossbreds. Two of the ♂♂ were produced by different parents each from 3 generations of treated ♂♂ and ♀♀; the 3rd ♂ had no treated forebears. In a period of 3 yrs. in an untreated flock of over 2000 Leghorns only one bird, which was immediately culled, had yellow shading on some feathers. (Animal Breeding Abstracts)

BOYER, J. P. 1955. [Sta. Rech. Avicol., Centre Nat. Rech. Zootech., Jouy-en-Josas, Seine-et-Oise.] Etude génétique du plumage de la Marans coucou argentée.
GENETIC STUDY OF THE PLUMAGE OF THE SILVERY COUCOU MARANS. *Ann. Zootech. [Paris], 4: 93-102.*

Breeding experiments were carried out with reciprocal crosses of Marans and Sussex and (R.I.R.×Wyandotte)×(Marans×Sussex) from which the following conclusions were drawn. The Silvery Coucou variety of Marans carries the gene B for sex-linked barring. The variety includes birds which are golden (ss) instead of silvery. A number of genes for plumage patterns are present, such as Sg, Pg, As. Not all birds are pure for E, some having the genotype Ee^+ or some form of the gene expressed by a black phenotype; E appears to be associated with a lethal factor. Marans have a factor for retarded decoloration, probably Wh. Silvery Coucou Marans should have the genotype EE B— S—, which would be ensured by testing all cocks with R.I.R hens before use on Marans hens. It should be possible to develop an autosexing golden or silvery variety.—Abstract of author's conclusions modified. (Animal Breeding Abstracts)

CHAMPION, LLOYD R. (Michigan State U., East Lansing.)
STUDIES IN HATCHABILITY. I. EFFECTS OF BACKCROSSING FIRST GENERATION FEMALES PRODUCED BY RECIPROCAL STRAIN CROSSES OF LEGHORNS. *Michigan State Univ. Agric. Expt. Sta., Quart. Bull. 37(3): 307-315. 1955.*—Reciprocal strain crosses were made of individuals from 2 strains of S. C. White Leghorns herein designated as Strain A and Strain B. The F_1 females were backcrossed to the 2d selected generation pure strain males. Hatchability results were: A x F_1 (AxB)—128 fertile eggs, 84.38% hatchability; B x F_1 (AxB)—100 fertile eggs, 84.00% hatchability; A x F_1 (BxA)—56 fertile eggs, 98.07% hatchability; and B x F_1 (BxA)—209 fertile eggs, 98.09% hatchability. Hatchability of eggs produced by individuals in B x F_1 (BxA) matings hatched better to a highly significant degree as compared with hatchability of eggs produced by individuals in all other backcross matings. A more favorable gene combination, or readjustment of genes for high hatchability is suggested as giving rise to heterosis in hatchability of embryos produced by individuals in B x F_1 (BxA) matings.—*L. R. Champion.* (Biological Abstracts)

COOPER, D. M. 1955. [Poult. Res. Sta., Anim. Health Trust, Houghton, Huntingdon.]
A COMPARISON OF ARTIFICIAL INSEMINATION WITH NATURAL MATING IN THE DOMESTIC FOWL. *Vet. Rec., 67:* 461-467.

Throughout a 300-day hatching period from 22nd Nov. 1953 to 17th Sep. 1954 two groups each of 48 Brown Leghorn×Barred Rock pullets were resp. pen-housed (A) with Barred Rock cockerels (16 pullets and 1 cockerel per pen), and caged individually (B) and artificially inseminated with semen from B.R. cockerels housed similarly to those in the pens.

The seasonal decline in fertility was more evident in penned birds, fertility of A and B being resp.: Nov-March 77.1% and 82.6%; April-June 79% and 86%; July-Sep. 55% and 82.2%; overall 73.4% and 83.4%. When data are discounted for 1 pen in which the behaviour pattern was abnormal, the corresponding figures for A are 92.4, 85.1, 72.2 and 86.3%. Early embryonic mortality was higher in B. Although hatchability of all eggs set favoured B the difference was not significant in the first 2 periods, but it was highly significant ($P=<0.01$) in July-Sep.

During a 44-wk. period egg production on a hen-day basis averaged 166 for A and 159 for B. (Animal Breeding Abstracts)

GASEK, M. 1955. [Dep. Exp. Biol. Genet., Inst. Biol., Czechoslovak Acad. Sci., Prague.] Voprosy vegetativnoi gibridizacii i peresadki tkani u teplokrovnyh zivotnyh.
VEGETATIVE HYBRIDISATION AND THE TRANSFER OF TISSUE IN WARM-BLOODED ANIMALS. *Z. obsc. Biol., 16:* 405-412. —Two eggs after incubation for 8-12 days were united in parabiosis by joining the blood vessels; tissue from a 3rd egg incubated for 20-40 hrs. was grafted to the chorion-allantois of each egg through a hole in the pointed end of the shell. The eggs were fitted together at the holes and fixed with paraffin wax. They were then incubated in a lying position. In all, 42 chicks were hatched from White Leghorn in parabiosis with R.I.R. eggs and 38 chicks from R.I.R. in parabiosis with W.L. eggs. All appeared normal. Similar parabiotic operations were carried out between Pekin duck and R.I.R. or W.L. eggs, and between turkey, pheasant or guinea-fowl and domestic fowl eggs. All the young appeared normal. The 6 experimental ducks produced an average of 86.3 eggs *v.* 66.8 for 11 control ducks. Chicks in parabiosis with ducks had a greater hatching weight than the control chicks. Immunological and blood factors were studied; any changes detected in the chicks were not present in their offspring. Chicks produced by experimental hens mated with cocks of their own breed had normal plumage. When control W.L.s were mated with R.I.R. ♂♂, almost all the chicks were white, but when experimental W.L.s were mated with R.I.R. ♂♂, the majority of the chicks were brown; this is attributed to an effect of embryonic parabiosis. (Animal Breeding Abstracts)

GAUGUSCH, Z. 1955. [Dep. Anim. Prod., State Vet. Inst., Pulawy.] Uwagi na temat przemyslowych krzyzowek drobiu.
OBSERVATIONS ON COMMERCIAL CROSSING IN POULTRY. *Med wet., 11:* 32-34.—Crosses between an R.I.R. cock and 6 Sussex hens were carried out at the Experiment Station of the Zootechnical Institute in Pawlowice in order to determine the value of this cross for the small farmer. The crossbred chicks are autosexing. The eggs were incubated artificially in 2 lots, the first in April, the second in May. The chicks were then brooded at a constant temperature (23-25°C.) for 4 wks. Within 5-6 wks. the young birds were sufficiently well feathered to withstand cold. At 10 weeks of age the ♀♀ were inoculated against fowl pest and retained for investigations on egg yield; the ♂♂ were killed and proved highly satisfactory, as they were fully feathered, with compact conformation, short neck, deep breast, and thighs well covered with meat. Both the skin and the meat were fleshy-white in colour. The flavour of the meat was good. The weight of the carcass after bleeding and plucking averaged 980-1080 g.; dressed weight averaged 950 g. (Animal Breeding Abstracts)

GIAVARINI, I. 1955. [Centro Avic., Bologna.] Osservazioni sul pollo uterano" e sul suo incrocio con galline de razza "Romagnola". THE UTRERANO BREED OF FOWL AND ITS CROSS WITH THE ROMAGNA BREED. *Ann. Sper. agr., N.S., 9:* 135-141. [English summary.]—The Utrerano is a Spanish breed somewhat similar in colour to the Plymouth Rock; adult live weight averages 3 kg. in ♂♂ and 2.3 kg. in ♀♀; eggs weigh 60-61 g. A small number has been imported into Italy from Spain; egg production of both pure Utrerano and Utrerano×Romagna progeny was superior to that of the Romagna. (Animal Breeding Abstracts)

GOODWIN, K., R. K. COLE, F. B. HUTT, and B. A. RASMUSEN. (Cornell U. Agric. Expt. Sta., Ithaca, N. Y.)
ENDOCRINE RELATIONSHIPS IN MALES OF A RELATIVELY INFERTILE STRAIN OF WHITE LEGHORN FOWLS. *Endocrinology 57(5):* 519-526. 1955—Among young males from 2 strains of White Leghorns differing in fertility, it was found that, while the growth of the body was similar, those from the relatively infertile strain had disproportionately larger pituitaries, testes, and combs. Spermatogenesis was closely correlated with size of testes. On the basis of organ weight, hormonal stimulation of the gonad appeared to be established very early in the infertile strain. No strain differences were seen in the microscopic structure of the pituitary, adrenal, or thyroid. The amount of gonadotropic hormone per unit of pituitary tissue (as determined by its effect upon the uteri of young mice) was equal in the 2 strains at 15-16 weeks of age, but the total weight of the anterior pituitary was about 1/3 larger in the infertile. Sexual maturity, measured by age at 1st egg, was consistently earlier for females of the infertile strain, although it might be unrelated to precocious sexual development of the males. These observations suggest that the larger pituitary of young males of the infertile strain may provide an excess of gonadotropic hormones which induce a precocious development of the testes, and thus an early development of the comb. Whether or not such changes are responsible for the relative infertility of their strain remains to be determined.—*Authors.* (Biological Abstracts)

HALE, E. B. (Pennsylvania State U., University Park.)
DEFECTS IN SEXUAL BEHAVIOR AS FACTORS AFFECTING FERTILITY IN TURKEYS. *Poultry Sci. 34(5):* 1059-1067. 1955. —Two factors, efficiency of males in completing attempted matings and sex drive of females, were observed to be important in the expression of fertility in turkeys. The effect of the above factors was magnified by a reduction in sexual receptivity of females following incomplete matings of the same order as that following completed matings. The correlation between male efficiency (range 12.5 to 97.5%) and pen fertility in 14 pens was +0.79 ($P<0.01$). Low social rank in multiple-male ratings reduced male mating efficiency. Average sex drive intervals for females ranged from 1.25 to 30 days. When the interval exceeded 7 days, there was a decline in average fertility. A positive correlation of 0.62 was noted between number of prelaying matings and sex drive interval during the laying period. Preferential mating was not seen. Detection of birds with behavioral defects and the possible relationship between aberrant behavior and low sex drive in males are discussed.—*E. B. Hale.* (Biological Abstracts)

HARPER, J. A. (Oregon State Coll., Corvallis.)
THE EFFECT OF HOLDING TIME OF TURKEY SEMEN ON FERTILIZING CAPACITY. *Poultry Sci. 34(6):* 1289-1291. 1955.—Four lots of 10 Beltsville White turkey hens each were maintained in individual cages and artificially inseminated over a 16-week period with pooled semen collections from 8 males of the same variety. Semen samples were mixed and hens inseminated with .03 cc immediately following or after 1, 2 and 4 hours of holding at temperatures from 55 to 60°F. Holding semen up to 4 hours was not detrimental to fertility for hens inseminated the first 3-week period starting Feb. 16. Later inseminations

through the season showed progressively that degree and duration of fertility was adversely affected by length of the holding period. Results show the need to use semen from turkey males in less than 1 hour's time following collection, particularly in the later part of the breeding season, to obtain good fertility through artificial inseminaton.—*J. A. Harper.* (Biological Abstracts)

HENDERSON, EARL W. (Michigan State U., East Lansing.)
SELECTION FOR GROWTH OF CHICKENS.—*Michigan State Univ. Agric. Expt. Sta. Quart. Bull. 37(3):* 292-300. 1955.—To improve growth rate of broilers by breeding prospective parental populations should be individually pedigreed and either progeny or sib tested. Populations should then be segregated in "superior" and "inferior" segments or groups by using as a "yard stick" the standard deviation of the 2 prospective parental populations. Only stock "superior" by at least 2 standard deviations should be used in matings. A simple method of estimating standard deviation by calculating the average deviation and multiplying by 125% is shown.—*E. W. Henderson.*

HENDERSON, EARL W. (Michigan State U., East Lansing.)
SELECTION FOR GROWTH OF CHICKENS. II. *Michigan State Univ. Agric. Expt. Sta. Quart. Bull. 38(1):* 123-128. 1955.—Two significantly divergent populations of chickens with respect to growth rate (weight of males at 12 weeks) were crossed. A "Red Cornish" population with an estimated average weight of 3.8 lbs. at 12 weeks (as measured from 240 males—3 generations) was crossed with a Silver Mutant population with an average weight of 3.3 lbs. (121 males—3 generations). The average weight of 89 F_1 male progeny was 3.5 lbs. which was significantly intermediate between parental averages. Subsequent mating of the "Red Cornish" population by the method of selecting from statistically superior segments raised the average weight of males from 3.8 lbs. to 4.3 lbs. in one generation.—*E. W. Henderson.* (Biological Abstracts)

HORN, A., N. NAGY and J. GASPAR.
THE HEREDITY (h^2) OF EGG-PRODUCTION AND EGG-WEIGHT IN THE BREED VARIETIES OF HUNGARIAN HENS. (A tojástermelés és tojássúly örökölhetosége (h^2) a magyar tyùk fajtaváltozastermelés, Budapest, 4: 309-316, 1955.

The Institute for Animal Husbandry of the University for Agricultural Sciences, Budapest-Godollo, examined by way of comparison of the dam-daughter-pairs the value of the heredity (h^2) of the egg-production and egg-weight of the various breed varieties of Hungarian hens.

Based on the average heredity data of the white, barred and yellow breed varieties, the h^2 value of the Hungarian hen, the yearly average number is 0.31, the yearly average h^2 value of the egg weight, however, was found to be 0.65. According to the heredity estimates, the heredity of the yearly average weight security of an egg is thus more than the double of the hereditary security of egg production. The h^2 value of both characteristics is in accordance to a great degree with similar foreign observations. There is only a small difference between the h^2 values of the individual breed varieties. The results of the yellow variety are somewhat more favorable than those of the other two breed varieties.

In the course of the examinations it was established that the average egg production of the progeny remains behind that of frequently well laying mothers, for the greater part it moves about the breed average. In order to clear this question the data of the first year egg production of 290 hens and their progeny, placed in the elit-stock of the Research Institute for Small Animals, were evaluated. These also confirmed that the yearly egg-production of the progeny of hens selected on the basis of their individual production varies round the breed-average more or less independently upon the degree of the mothers, production level.

Contrary to this the average egg-weight of the progeny of the selected hens is in a better concordance with the results of the mothers. (Hungarian Agricultural Review 2. 1956.)

HRANOVSKII, P. A. 1955. [Sevcenko State Univ., Kiev.] Selekcionnoe znacenie izmencivosti veliciny polovyh zelez u domasnih ptic.

THE IMPORTANCE FOR SELECTION OF THE VARIATION IN SIZE OF GENITALIA IN POULTRY. *Dokl. Akad. Nauk SSSR, 104*: 482-484.—Work was carried out by the Ukranian Poultry Breeding Research Station with geese at state and collective farms. Measurements were made with a specially constructed instrument inserted during laparotomy. At 3-3½ mths. of age intrabreed variation in measurements of the genitalia was considerable within the Borkov and Romen breeds [?geese at the farms Borok and Romen]; there was less variation in measurements within the Chinese breed. Two groups each of 14 ♂♂ in which testis length was 14.5-19 mm. and 8-9.5 mm. resp. were mated to 2 groups each of 42 ♀♀; of 2500 eggs laid 2135 were set between 6th March and 1st June. Fertility in the 2 groups averaged 51.6 and 30.5% resp.; in the last 9 settings (*i.e.* 20th April-1st June) it averaged 22.0 and 8.3% resp. (Animal Breeding Abstracts)

HUTT, F. B., and R. K. COLE. (New York State Coll. Agric., Cornell U., Ithaca, N. Y.)

RESISTANCE TO LYMPHOMATOSIS IN THE FOWL IN RELATION TO REPRODUCTION. Nature 176(4494): 1178-1179. 1955.—Data are given which show that resistance and susceptibility to lymphomatosis in the progeny in domestic fowl are not related to efficiency of reproduction in the dam. (Biological Abstracts)

INDIAN FARMING. 1955.

BETTER FOWLS AT LOWER COST. *Indian Fmg, 5(6):* 38-39. 335 At the Government Model Poultry Farm, Delhi Cantonment, a commercial cross between W.L.s and R.I.R.s has been found to give a higher egg production than the purebreds. Crossing with R.I.R.s has increased production of *desi* hens, selected for broad and deep body, well-developed comb and wattles and prominent eyes, from 53 to 135 eggs, egg weight from 1¼ to 1¾ oz. and live weight from 3 to 4 lb. (Animal Breeding Abstracts)

IVANOV, V. G. 1955. [Gercena State Training Coll., Leningrad.] Vlijanie sroka hranenija jaic na sootnosenie polov v potomstve kur.

THE EFFECT OF THE DURATION OF STORING EGGS ON THE SEX RATIO. *Dokl. Akad. Nauk SSSR, 100:* 1021-1023.—In 1953 at the Kotlyarev Poultry Breeding State Farm in the Kabardino A.S.S.R. eggs from White Leghorns of similar age and on similar levels of nutrition were held at 6°-8° for various times before setting. The sex ratio was based on the examination of day-old chicks or of dead embryos. When the eggs were set within an hour of being laid, 63.3% of the chicks were ♀♀ *v.* 43.8, 47.0 and 42.6% when the eggs were held for 6, 11 and 1 days resp.; the av. sex ratio for 56,033 non-experimental eggs set was 44.5% ♀♀. Hatchability was highest (98.9%) for the new laid eggs; it was 94.6, 94.3 and 75.2% resp. in the other groups. (Animal Breeding Abstracts)

KAWAHARA, T. 1955.

A SEX-LINKED NERVOUS DISORDER IN THE DOMESTIC FOWL. *Rep. nat. Inst. Genet. (Jap.)* [*Misima, Sizuoka-Ken*], *No. 5* (1954): 26-27.—A nervous disorder characterised by a slight tremor of the head and neck was observed in fowls derived from a mating between a Barred Plymouth Rock cock and his half-sister. Usually the disorder was already apparent in day-old chicks, but its onset was in some cases delayed for 4 or more weeks. About half of the afflicted ♀♀ were unable to stand or walk by the time they were 20 wks. of age and eventually died. The others reached sexual maturity, but they were often below average in egg production. The disorder appears to be due to a recessive,

sex-linked gene. The symptoms are similar to those found in the "shaker" fowl, but degeneration of the Purkinje's cells in the gyri of the cerebellum takes place before that of the rest of the cerebellum, not after, as in shaker fowls. (Animal Breeding Abstracts)

KIMBALL, E. (Clinton Exptl. Farm, Conn.)
COCK-FEATHERED LACED WYANDOTTE AND WHITE-LACED RED CORNISH. *Poultry Sci. 34(6):* 1449-1451. 1955.—Evidence is submitted to show Laced Wyandotte and White-laced Red Cornish fowls are cock-feathered, and that laced pattern is expressed in plumage of cock-feathered males, as opposed to the view of E. W. Henderson that the breeds are hen-feathered, and that lacing requires hen-feathering in the male for expression.—*E. Kimball.* (Biological Abstracts)

KONDRA, P. A., and R. N. Shoffner. (U. of Minnesota, St. Paul.)
HERITABILITY OF SOME BODY MEASURE AND REPRODUCTIVE CHARACTERS IN TURKEYS. *Poultry Sci. 34(6):* 1262-1267. 1955.—The experimental population included Standard Bronze (A), Broad Breasted Bronze (B), Beltsville Small Whites, and crosses of A and B. Physical body measurements were taken at 24 weeks of age and heritability estimates were obtained by the intra-sire regression of offspring on dam. There was considerable variation between strains, and in some cases between sexes, in the h^2 values, which ranged as follows: live body weight 0.24 to 1.12; shank length –0.62 to 1.19; body depth 0.21 to 0.70; breast width –0.13 to 0.69; keel length –0.12 to 0.44; egg production –0.65 to 0.13; fertility –0.14 to 1.98; hatchability 0.00 to .92; livability to 6 months –0.98 to 0.32; and meat yield per dam –1.14 to –0.26. Results suggest that family selection and progeny testing are essential for improvement of reproductive traits in turkeys. Body weight, an important economic factor, and to a lesser degree breast width, which affects consumer appeal, can be selected for on an individual basis. Both of these should not be over emphasized at the expense of reproductive traits such as egg production, fertility and hatchability which play a major role in economy of turkey production. Other physical traits studied have little if any additional significance in selection for increased meat yield on the individual carcass.—*P. A. Kondra.* (Biological Abstracts)

KONDRA, P. A., and R. N. Shoffner. (U. of Minnesota, St. Paul.)
CROSSING STRAINS AND BREEDS OF TURKEYS. *Poultry Sci. 34(6):* 1268-1274. 1955.—The experimental population included 3 strains of Broad Breasted Bronze, 1 strain each of Standard Bronze, Beltsville Small Whites, Buff, and Brown turkeys. In general, single crosses between strains showed little or no heterosis for body weight, egg production, fertility or hatchability. Three-strain crosses showed considerable heterosis for body weight, fertility and hatchability. Single crosses between breeds showed considerable heterosis for fertility and hatchability, but little or none for body weight. Viability of the various progenies was relatively uniform. Meat yield per dam was considerably greater for three-strain crosses than for pure strains. This complex trait was largely related to egg production of the female parent and fertility of the cross. Results suggest the possibility of considerable benefit from heterosis in a planned crossing program. Characteristics studied appear to exhibit a quantitative mode of inheritance. Results suggest that when high meat yield per dam is the objective, emphasis should be placed on high egg production in the female parent, and high fertility and hatchability of the cross. High body weight should not be over-emphasized because, within the weight range of the heavy breeds, increased body weight did not reflect in increased meat yield per dam.—*P. A. Kondra.* (Biological Abstracts)

KUSNER, H. F. 1954. [Inst. Genet., Acad. Sci. U.S.S.R.] Povysenie produktivnosti kur v rezuljtate mezporodnogo skrescivanija.
INCREASING THE PRODUCTION OF FOWLS BY CROSS-BREEDING. *Agrobiologija, 1954 (4):* 86-91.—Results of experiments

carried out between 1947 and 1954 at various research stations are indicated. In each experiment White Leghorns were crossed with New Hampshires, Australorps or Plymouth Rocks; live weight, hatchability and egg production were greater in the cross-breds than in the W.L.s. (Animal Breeding Abstracts)

KUSNER, H. F. 1955. [Inst. Genet., Acad. Sci. U.S.S.R.] Effektivnostj ispoljzovanija petuhov russkoi beloi porody dlja ulucsenija leggornov.

THE EFFICACY OF USING RUSSIAN WHITE COCKS TO IMPROVE LEGHORNS. *Dokl. Akad. Nauk SSSR, 101:* 557-560.—The Russian White breed has recently been established and, although developed from the Leghorn, has greater live weight and higher egg production. At the Institute of Genetics in 1952 two Russian White cocks were put with one group of 26 Leghorn hens, and 2 Leghorn ♂♂ and 26 Leghorn ♀♀ served as controls. In the experimental group hatchability was 10% higher; the av. weight of day-old chicks was slightly less but live weight at 1 yr. was greater (2083.6 *v.* 1857.0 g.) The experimental pullets came into lay at 215.6 days *v.* 191.7 days for the controls but egg production was more intense and in the 1st year the experimental pullets produced 138.6 eggs *v.* 137.0 for the controls; egg weight averaged 58.0 and 56 6 g. resp. Hatchability was 74.2% when the experimental pullets were mated with Russian White cocks, 70% when they were mated with Leghorn cocks, and 64.0% when Leghorns were bred pure; mortality to 3 mths. was 12.02, 14.2 and 16.5% resp. Egg production in the 1st year was greatest in the Russian White backcross and least in the controls. (Animal Breeding Abstracts)

LEBEDEV, M. M., and P. G. KLABUKOV, 1952. Vlijanie razlicnogo vospitanija sparivaemyh zivotnyh na ziznennostj potomstva.

THE EFFECT OF MATING ANIMALS REARED UNDER DIFFERENT CONDITIONS ON THE VITALITY OF THE PROGENY. *Trud. Puskin. nauc.-issled. Lab. Razved. set.-hoz. Zivotn., No. 5:* 68-87.—In 1949 some day-old Leghorn chicks hatched near Puskin were sent by air to the Novosibirsk Province, Tashkent or Novocherkassk, at all of which climate and management were very different from those at Puskin. They were returned to the Puskin Institute after a year. There was no appreciable difference in the performance of hens mated with the experimental ♂♂ and of those mated with the ♂♂ reared at the Institute. The experiment was repeated with similar results.

In 1951 a batch of experimental ♂ chicks was segregated and reared under different conditions of management at the Puskin Institute, or elsewhere in the same district. Fertility percentage, hatchability and chick survival were higher when the ♂♂ reared under different conditions were used on ♀♀ at the Institute. The haemoglobin percentage, erythrocyte number and spermatozoal concentration and resistance were higher in the experimental ♂♂ than in those reared with the ♀♀ at the Institute. (Animal Breeding Abstracts)

MADDISON, A. E. 1954. [Wye Coll., Univ. London.]

THE USE OF PARTIAL RECORDS IN POULTRY SELECTION. *Proc. Brit. Soc. Anim. Prod., 1954:* 109-115.—Sixty full-sister groups, each of about 16 birds of the R.I.R. breed, are recorded from 1st egg to the end of Nov. At least 3 full brothers of each sister group are also kept. Seven of each group of 16 are housed in a laying battery, the others in free-range trapnest houses. The breeding flock is made up in mid-Dec. on the basis of production and viability records. The sires used are the brothers of the best sister groups, but inbreeding is avoided. Hens in the laying battery are left undisturbed to complete a full year's production. Primary selection is on the basis of partial records; full records eliminate only those which were wrongly selected the first time. Advantage from use of the partial record is obtained from shortening the generation interval from 2 yrs. to 1 yr. Heritabilities of egg production based on partial records were in Nov. 0.240, in Dec. 0.252, and on the full record in July 0.203. The genetic gain in egg production per

generation was greater with the full than with the partial record, but the gain per year was greatest with the use of partial records, giving the latter an advantage in efficiency over full records of about 1.5: 1 in a system of individual selection, and also in a system based on individual plus sisters' records. (Animal Breeding Abstracts)

McCARTNEY, MORLEY G. (Pennsylvania State U., University Park.)
HERITABILITY OF EGG PRODUCTION IN WHITE HOLLAND TURKEYS. *Poultry Sci. 34(6):* 1280-1283. 1955.—Heritability estimates calculated for survivor egg production were based on the female progeny of 27 single-sire matings with 161 dams over a 4-year period. Heritability value estimated from paternal half-sister correlations was 29.3%. Results indicated that selection based on combination of individual performance and full-sister family averages is the most efficient method of improving egg production.—*M. G. McCartney.* (Biological Abstracts)

MOLTONI, A. 1955. Avicoltura in alta montagna. [I.] II.
POULTRY BREEDING AT HIGH ALTITUDES. [I.] [II.] Riv. *Zootec., 28: 93-96; 125-129.*—For about 20 yrs. the Zootechnical Institute of Piedmont [Italy] has run an Experimental Station at Sauze d'Oulx, 1865 m. above sea level. Results of work carried out there on the adaptability of birds to an alpine environment have already been published [*see* Vezzani, *A.B.A.*, 9: 246]. More recently New Hampshire, R.I.R., Sussex and Plymouth Rock birds have been introduced. The performance of the last-named has been particularly satisfactory. (Animal Breeding Abstracts)

NAGY, N., V. GERENCSER and E. KERTESZ.
BIOLOGICAL AND GENETICAL FEATURES OF BANKIVA AND LEGHORN CROSSINGS. (Bankiva és Leghorn keresztezések biologiai es oroklestani vonatkozasai.) Agartudomany Egyetem Allattenyesztesi Kar Kozlemenyei, Budapest—Godollo; 17-34. 1955.—The purpose of their examination was to establish, whether the ancestor of our domestic hen, the Gallus Bankiva may, and in what measure be used by the way of crossing with standard breeds to confirm the biological characteristics of the organism and the capacity of resistance. In our experience we crossed Bankiva with white and brown Leghorn hens. The Bankiva cocks did not mate with the White Leghorn hens until the beginning of May. The fertility of eggs increased from 40 to 60 per cent till mid-June. The crossed F_1 white hens showed a great resistance against the raising diseases and the mortality losses remained under 5 per cent. The feathering surpassed that of pure bred Leghorns. The moulting of the F_1 generation took its course similar to that of wild birds from mid-summer till late in the autumn. Besides the smaller pretentions of the individuals of crossed generations they had a considerably greater susceptibility to diseases of cultivated breeds and disposed of smaller immunity. After vaccination against fowl plague the mortality rate of the pure bred standard breeds was 7.4 per cent, that of F_2 was 12.5 per cent, that of F_1, however, 24.3 per cent. Based on the results of the examinations it may strongly be disputed whether the increase of firmness of the organism of standard breeds and the increase of their resistance can be achieved by outcrossing them with their wild ancestors. (Hungarian Agricultural Review. 2. 1956.)

NESTEROV, N. S., G. SLACEV, and G. K. KICEV, 1955. [Kolarov Higher Agric. Inst., Plovdiv, Bulgaria.] Izmenenie nasledstvennoi prirody u ptic putem mezvidovoi zameny belka v jaice.
CHANGES OF AN INHERITED NATURE IN BIRDS BY INTER-SPECIFIC EXCHANGE OF ALBUMEN IN THE EGG. *Izv. Akad. Nauk SSSR, Ser. biol., 1955 (5):* 105-117.—In 2 experiments 53 and 50 eggs resp. from purebred Leghorns had a hole 0.5 cm. in diameter pierced in the shell and 5-10 $cm.^3$ albumen from 3-day incubated turkey eggs injected. The albumen displaced was found in a test experiment to be Leghorn albumen. The hole was sealed with sterile egg-shell

and the eggs returned to the incubator. In the 2 experiments resp. 15 and 5 chicks were hatched *v.* 25 of 30 and 15 of 20 controls. At hatching there was no appreciable difference between the experimental and control chicks. At 6 mths., 4 birds from experimental eggs had grey-black feathers (5-20 each) and 3 had dark scales on the legs. The live weight of the experimental was greater than that of the control chicks. The experimental pullets came into lay in Nov. and the controls in Dec.; production to the following July averaged 80.6 and 72.08 eggs resp. Of 128 and 223 eggs set from experimental and control birds 74.2 and 73.1% resp. hatched. Characters noted in the dams were repeated in their offspring. The blood picture was studied and it was concluded that blood indices confirmed the authenticity of the changes induced by vegetative hybridisation. (Animal Breeding Abstracts)

PEASE, M. [? 1954.] [Sch. Agric., Cambridge.]

ANOTHER CASE OF UNEXPECTED BLACK CHICKENS. *Autosexing annual*, 1955. [*Harlow, Essex*]: *Autosexing Breeds Association.* Pp. 13-16.—In grading up Brussbars by use of Light Sussex, L.S. ♂×Brussbar ♀♀ gave a percentage of striped down chicks; all except one developed Columbian type adult plumage, and all were ♀♀. The striped chicks came from particular matings. When the F_1 ♀♀ were in turn mated to Brussbar ♂♂, the expected equality of light and striped downs in their progeny was replaced by a ratio of 111 light to 60 striped. This may be due to the presence of the gene, Retarded, which is found in the Sussex.

A similar improvement programme, of Silver Brussbars with L.S., produced 9 black or near black-downed chicks which developed dark Cuckoo type adult plumage. In some of the further matings of these off-type birds the black bred true. Thus a reputed dominant, black, was obtained from a cross of two recessives, Columbian and Black Red. *J. S. S. Blyth.* (Animal Breeding Abstracts)

PIKO, L. and A. SUSCHKA, 1955

CONTRIBUTION TO THE VEGETATIVE HYBRIDIZATION OF POULTRY. (Adatok a baromfi vegetativ hibridizaciojahoz) Allattenyesztes, Budapest, 4:373-380, 1955.—Authors made examinations on poultry in the Institute for Animal Husbandry at the University for Agricultural Sciences for the establishment of the influence of blood transfusion and the exchange of blood between ducks and geese as well as of turkey and chickens. In general they made use of blood, collected from several animals but always transfused blood of animals of the same sex. In order to avoid the coagulation of blood, it was mixed with 3.8 per cent citrate in a proportion of 1 to 10. In some cases 5-10 ml of blood was injected every other day during three weeks, intravenously or intramuscularly, while in other cases, also every other day, 60-230 ml blood was given intravenously at three occasions and at the same time blood takings were also accomplished.

From the results of the blood examinations authors stated the fact that generally the blood transfusion increased the blood indices (hematocrit per cent, Hb- content, and erythrocyte count). There was especially a decided consistent increase in the Hb-percentage (by 10-26 per cent).

The influence of blood transfusion on the egg production was examined. The blood transfusion increased the egg production by 5.7 per cent; the egg weight, however, showed a decreasing tendency. The shape of the eggs became more elongated. The offsprings of the experimental ducks up to the age of 10 weeks surpassed the weight of the control birds by 4-7 per cent and showed a substantially lower mortality rate (7.5 per cent against 23.7 per cent).

Authors made also an albumen exchange between 4 goose and duck eggs respectively. After an exchange of 10 ml of albumen they obtained 1 goose and 3 duck offsprings. No alteration was observed but there was an obvious increase in the growth rate of ducks of the exchanged albumen (by 12.0-26.3 per cent, as compared with the control birds). (Hungarian Agricultural Review 2 1956.)

REDIH, V. K. 1955. Petuhi pervomaiskoi porodnoi gruppy v skrescivanijah s kurami russkoi beloi porody.

THE USE OF COCKS OF THE PERVOMAI BREED GROUP ON RUSSIAN WHITE HENS. *Dokl. Akad. seliskohoz. Nauk Lenin.*, 20(2): 30-31.—The indigenous Pervomai [First of May] breed group is dual-purpose, and is widely distributed in collective and state farms in the Ukraine, the Turkmen and the Tadzhik Republics, the Penza, Kuibyshev, Saratov and Moscow Provinces, the Krasnodar Territory, and the Bashkir A.S.S.R. In 1952-53 at the Kuban State Farm in the Krasnodar Territory Pervomai cocks were used on Russian White hens. The hatchability of fertile eggs of crossbred hens averaged 95% *v.* 91.5% for Russian White eggs and 80.2% for Pervomai eggs; live weight at 3, 10 and 27 mths. was appreciably greater than that of Russian Whites and was similar to that of the Pervomais. Egg production in the first 2 yrs. was greater than that in either parent breed. Food utilisation was not appreciably different from that in Russian Whites but was more efficient than in the Pervomais. When the crossbred hens were backcrossed to Pervomai cocks, live weight to 110 days and egg production in the first year were greater than in the Pervomais. (Animal Breeding Abstracts)

RUUS, C. H. 1956. [Estonia Agric. Acad.] Ovlijanii "vozrasta" spermatozoidov petuha na process oplodotvorenija.

THE EFFECT OF "AGE" OF COCK SPERMATOZOA ON THE PROCESS OF FERTILISATION. *Pticevodstvo*, 6(2): 26-29.—Three groups each of 13-16 Leghorn hens were kept separate from ♂♂. Hens in 1 group were mated with a Leghorn ♂ and ¼-2 hrs. later with a R.I.R. ♂. All the chicks hatched from eggs laid in the first 3 days after mating were purebred Leghorns and thereafter the number of crossbred chicks increased progressively; of all chicks hatched from eggs laid in the first 10 days after mating, 54.9% were crossbreds. In the 2nd group the hens were mated once with a Leghorn and once with a R.I.R. ♂ within 24 hrs., and with a 2nd R.I.R. 24 hrs .after the 2nd mating. In the 3rd group they were mated once with a Leghorn ♂ and 4 days later once with a R.I.R. ♂. In the 2nd and 3rd groups chicks hatched from eggs laid on the day after the last mating were all purebred Leghorns and thereafter the percentage of crossbred chicks increased progressively; of the total number of chicks from eggs laid in the first 10 days after last mating, 83.7 and 83.05% resp. were crossbreds. (Animal Breeding Abstracts)

SAEKI, Y. 1954.

THE INHERITANCE OF SHANK FEATHERING (PTILOPODY IN THE SILKY FOWL. *Bull. nat. Inst. agric. Sci.* [*Chiba*], *G*, No. 9: 43-47. [Japanese with English summary.]—All the progeny of *inter se* crosses between Silkies and of crosses between a Silky cock and 8 White Leghorn hens (all clean-footed) had feathered shanks. The results of matings between a ♂ Silky and 10 Barred Plymouth Rock hens, of matings between the F_1 progeny of this cross, and of backcross matings confirmed the view that ptilopody is mainly controlled by a single autosomal dominant gene, although the degree of shank feathering may also be affected by other factors. Shank feathering tended to be expressed more strongly in ♂♂ than in ♀♀.—Abstract of summary. (Animal Breeding Abstracts)

SAEKI, Y. 1954.

ON THE DEVELOPMENT AND INHERITANCE OF POLYDACTYLY IN THE SILKY FOWL. *Bull. nat. Inst. agric. Sci.* [*Chiba*], *G*, No. 9: 49-55. [Japanese with English summary.]—The extra toes of polydactylous birds, which develop from the metatarsus or hallux on the inner side of the foot, were first visible macroscropically on the 8th day of incubation. The results of test matings between a ♂ Silky fowl homozygous for polydactyly and normal White Leghorn and Barred Plymouth Rock hens indicated that the condition is mainly due to a single autosomal dominant gene (*Po*). Penetrance is believed to be

affected by environmental factors.—Abstract of summary. (Animal Breeding Abstracts)

SCHINDLER, H., SHOSHANA WEINSTEIN, E. MOSES, and ILSE GABRIEL. (Agric. Res. Sta., Rehovot, Israel.)
THE EFFECT OF VARIOUS DILUENTS AND STORAGE TIME ON THE FERTILIZING CAPACITY OF COCK SEMEN. *Poultry Sci. 34(5)*: 1113-1117. 1955.—Cock semen diluted with Ringer's solution, Locke's solution, whole milk, or undiluted, retained full fertilizing capacity after storage for up to 4 hours at 10°C or 4°C. Dilution with yolk-phosphate buffer, dilution after storage for 2 hours, or storage at 41°C considerably reduced fertility. After 24 hours storage partial fertility was maintained only in undiluted semen kept at 10°C, and in semen diluted with whole milk, kept at 4°C.—*H. Schindler.* (Biological Abstracts)

SKALLER, F., and B. L. SHELDON, 1955. [Poult. Res. Centre, Werribee, Vict.]
INTERACTIONS OF GENOTYPE AND ENVIRONMENT IN DETERMINING SEXUAL MATURITY IN THE DOMESTIC FOWL. *Aust. J. agric. Res., 6:* 171-185.—Sexual maturity data of 1762 pullets from 4 differently bred flocks at Werribee were examined for interaction between genotype for age at sexual maturity and the environment as represented by different hatching dates. Interaction was significant in 2 of the flocks studied and there was some interaction, though not significant, in the other flocks. Progressively later hatching caused significant increases in age at maturity in all flocks, but large differences in sexual maturity between sire families did not occur. The occurrence of interaction in other flocks and its effects on current poultry breeding methods are discussed. It is concluded that interactions of the order of those reported in this paper are not of a sufficient magnitude to warrant revision of present methods.—*Author's summary.* (Animal Breeding Abstracts)

SMETNEV, S. I. 1954. Vysokoproduktivnye porody ptic.
HIGHLY PRODUCTIVE BREEDS OF POULTRY. *Nauka i Zizn, 21 (10)*: 12-13, 16.—One of the most widely distributed breeds of fowl is the Russian White, which was developed by using Leghorns on indigenous fowls. On various farms egg production averages 165-225 per year; each egg averages 60-75 g., and live weight averages 2.2 kg. for ♀♀ and 2.8 kg. for ♂♂. The Moscow breed group of fowl is described. The North Caucasus turkey was developed at collective farms in the Stavropol Territory by crossing the small indigenous type with Broad Breasted turkeys. They are characterised by high egg production, good quality meat, and longevity; in 1953 at a large collective farm live weight averaged 8 kg. and production 76 eggs. In Moscow Province, Zerkaljnye ducks average 130 eggs per year, and have an av. live weight of 3 kg. (Animal Breeding Abstracts)

SMETNEV, S. I., I. V. NIKULICKII, and O. N. FILIPPOVA, 1955. [Brattsev Hatchery, and Dep. Poult. Breed., Timirjazev Agric. Acad., Moscow.]
THE MOSCOW BREED GROUP OF FOWL. *Pticevodstvo, 5 (7):* 20-25.—The Moscow breed group has been developed during the last 8 years by crossing Yurlov fowls with Brown Leghorns and New Hampshires and mating the progeny *inter se.* Egg production and weight exceed those of the parent breeds. The av. egg production has increased steadily from 120 in both 1946 and 1947 to 182 in 1954, and av. egg weight from 59 g. in 1948 to 62 g. in 1954. In each of the last 3 yrs. 27% of the eggs have been laid in the winter months. Pullets come into production at about 150 days of age. The Moscow breed group is also a meat strain. At 180 days ♂♂ average 2750 g. live weight and ♀♀ 2020 g.; adult live weight averages 3.5 and 2.7 kg. resp. Several good lines have been developed at the Hatchery and the ♂♂ are used on selected ♀♀. In 1953-54 8000 chicks were distributed to collective

farms from the Hatchery. These fowls acclimatise well in other districts. (Animal Breeding Abstracts)

SOPIKOV, P. M. 1954. [Leningrad Base, Poult. Breed. Res Inst.] Izmenenie nasledstvennosti putem parenteraljnogo vvedenija krovi.

CHANGES IN INHERITANCE BY THE PARENTERAL ADMINISTRATION OF BLOOD. *Agrobiologija, 1954 (6):* 36-45.—In 1948 blood from a vein under the wing of Black Australorp ♂♂ was injected intravenously, intramuscularly or subcutaneously into White Leghorn ♀♀ which were then mated with W.L. ♂♂. The injections were given twice weekly for 2½ mths. before the eggs for incubation were laid, and 2½-3 ml. blood was injected per kg. live weight. Some of the progeny had several black feathers (8-40 per bird) in their white plumage. When a similar experiment was made with W.L. donors and Australorp recipients some of the progeny had white feathers (5-25 per bird) in otherwise black plumage. Compared with the purebred controls, the experimental birds showed an increase in live weight, larger neck and body, longer legs, and abnormal pigmentation of the legs, of the external meatus and around the eye. The colour of some of the shells of eggs laid by W.L.s injected with Australorp blood resembled that of Australorp shells. These changes were increasingly greater in each succeeding generation of birds in which the treatment was continued. In the 3rd generation plumage was white, white with black feathers, light-grey to grey, or black like that of the Australorp donors, although in the last the other characters resembled those of the W.L.'s.

When young W.L's were injected with blood from adult highly productive W.L.s, the progeny had greater vitality, higher production and greater resistance to disease than the purebred, untreated controls.

In 1949 the blood of Chuvash geese was injected into W.L.'s and into Khaki Campbell ducks. Abnormal characters similar to those described above were observed in the progeny. In addition the experimental W.L.'s were more resistant to pullorum disease to which anserine birds are not susceptible. In 1951 blood from Bronze turkeys was injected into W.L.s and similar results were observed. One 3rd generation ♂ weighed 4 kg. at 7 mths. The changes are attributed to the gradual adaptation of the organism to the different type of nourishment which, by affecting the type of assimilation and metabolism, alters genetic characters. A flock of treated birds has been built up. (Animal Breeding Abstracts)

TRETJJAKOV, N. P. 1954. [Poult. Breed. Inst.] Zagorskie kury.

ZAGORSK HENS. *Nauka i Zizn,* 21 (5): 32.—The Yurlov, Russian White, New Hampshire and R.I.R. breeds were crossed to form the Zagorsk breed group of meat/egg fowl. Three color variations were developed, the white, salmon, and straw-coloured with white tail. Egg production averaged 180 eggs per year, and live weight 2.6 kg. at 1 yr. and 3 kg. at 1½ yrs. The meat is of good quality. (Animal Breeding Abstracts)

WILLIAMS, CLETIS (Oklahoma A. and M., Coll. Stillwater), and **W. H. McGibbon.** (U. Wisconsin, Madison.)

THE DURATION OF FERTILITY OF MALES OF TWO INBRED LINES WHEN MATED TO FEMALES OF EACH OF THE INBRED LINES. *Poultry Sci. 35(1):* 168-170. 1956. (Biological Abstracts)

YAMADA, Y. 1955.

GENETIC VARIATION AND COVARIATION IN ECONOMIC TRAITS IN SOME BREEDS OF CHICKENS. *Rep. nat. Inst. Genet. (Jap.)* [*Misma, Sizouka-Ken*], No. 5 (1954): 27-28.—Estimates of heritability and genetic correlations were based on records of White Leghorns, Barred Plymouth Rocks and R.I.R.'s over a 3-year period. The heritability for sexual maturity was estimated to be 0.480. No maternal effect was found. For body weight at about 9 wks., body weight at first egg, winter egg production (1st Dec. to end Feb.), spring egg

production (1st March to end May), and total egg production (first egg to end of May) the estimates of heritability were 0.462, 0.428, 0.313, 0.169 and 0.148 resp.

The estimated genetic correlations between the characters studied were as follows: 0.003 for sexual maturity and mature body weight, —0.217 for sexual maturity and body weight at sexual maturity,—0.210 for sexual maturity and winter production rate, 0.173 for winter production rate and body weight, 0.187 for winter production rate and spring production rate, 0.817 for spring rate and total rate, and 0.767 for body weight at sexual maturity and mature body weight. (Animal Breeding Abstracts)

YAMASHINA, Y. 1953.
STUDIES ON HYBRIDISATION BETWEEN A DOMESTIC DRAKE AND A CHINESE GOOSE. *Misc. Rep. Yamashima Inst. Orn. Zool.* [*Tokyo*], No. 2: 39-44. [Japanese with English summary.] From abstract in *Jap. Sci. Rev., Biol.*, 1955, No. 4, No. 132. Attempts, including the use of A.I., were made to obtain progeny from a domestic drake and a Chinese goose. Of 38 eggs laid by the Chinese goose 24 were apparently infertile, 12 embroys died within 2 days, one embryo died after a week's development, and one young bird died soon after hatching. The last-mentioned, a male, had a deformed bill but otherwise appeared to be anatomically normal. The incubation period was 28 days. (Animal Breeding Abstracts)

PHYSIOLOGY

ANOROVA, N. S. 1955. [Lomonosov State Univ., Moscow.] Vlijanie vozrasta roditelei na postembrionaljnoe razvitie i ziznesposobnostj potomstva u ptic.
THE EFFECT OF AGE OF PARENTS ON THE POST-EMBRYONIC DEVELOPMENT AND VIABILITY OF THE PROGENY IN POULTRY. *Dokl. Akad. Nauk SSSR, 100;* 269-371.—In December 1952, 220 chicks were hatched from pullets' eggs and 200 from the eggs of year-old hens; the initial and subsequent weights of the latter were greater than those of the former. The progeny of both groups came into production at the same age (145 days). The production of the former was 5% less than that of the latter in the first 8 mths. but was not appreciably different at the end of 1 yr. The mortality rate was higher in the former. (Animal Breeding Abstracts)

ASSEM, M. A., and **M. T. RAGAB.** (Animal Breeding Dept., Fac. Agric., Cairo U., Egypt.)
RATE OF LAYING, PERSISTENCY AND PAUSING IN BALADI AND FAYOUMI FOWLS. *Poul. Sci. 34(5):* 1027-1029. 1955.—First year egg production records for 286 Baladi and 245 Fayoumi fowls, were studied. Intensity, estimated by the average clutch size, was 1.75 and 1.87 eggs in Baladi and Fayoumi, respectively. Persistency measured by average egg production of August and September together, was 19.03 eggs in the Baladi and 18.66 eggs in the Fayoumi. There was a positive correlation of 0.481 in the Fayoumi between this character and the annual egg yield compared to 0.453 in the Baladi. Average length of pauses in Baladi was 15.84; in Fayoumi 17.18 days, with a longest seasonal pausing in Autumn. It was 18.64 and 21.85 days for Baladi and Fayoumi, respectively.—*Authors.* (Biological Abstracts)

BAELUM, J. [? 1954.] Aegundersogelser.
STUDIES ON EGGS. Reprinted from *Oversigt over forsogslaboratoriets arbejder* 1953-54. Pp. 53-60. Percentage weight of shell and thickness of albumen in eggs laid by 2165 hens of 7 breeds varied

from less than 7.0 to 11.49% and from less than 3.0 to more than 6.0 mm. resp. There was no correlation between the two variables. During the 6 mths. Feb.-July av. percentage weight of shell decreased from 9.29 to 8.69. Breed differences were considerable. Eggs with the greatest percentage weight of shell (9.41) were laid by Sussex birds; those with the least (8-21) by New Hampshires. Albumen was thickest (4.5 mm.) in eggs laid by New Hampshires and R.I.R.s, and thinnest (3.7 mm.) in those laid by White Leghorns. (Animal Breeding Abstracts)

BIELLIER, H. V., and C. W. TURNER. (U. Missouri, Columbia.)
THE THYROXINE SECRETION RATE OF GROWING TURKEY POULTS. *Poul. Sci. 34(5):* 1158-1162. 1955.—The goitrogenic technique was used in determining the thyroid gland secretion rate of Broad Breasted Bronze and Beltsville Small White poults from 3 to 10 weeks of age. Daily rates of secretion of Beltsville White poults expressed as μg of *d*, 1- thyroxine/100 g body weight at 3, 6, and 10 weeks of age were: 2.31, 1.93, and 1.52, respectively, for males and 2.55, 2.30, and 1.67, respectively, for females. Thyroxine secretion rates of turkey poults were found to be intermediate between previously reported rates for chicks and ducks of similar weight and age.—*H. V. Biellier.* (Biological Abstracts)

BOGRE, J.
EXAMINATION DATA REFERRING TO THE QUESTION OF LARGE GOOSE LIVERS. (Vizgálati adatok a nagy libamáj kérdéséhez) Allattenyésztés. *Budapest, 4:* 381-389. 1955.

Among the Hungarian poultry products the goose liver deserves particular attention. In spite of this relatively few concrete data dealing with this question are at our disposal.

Goose fatteners deal for a long time past with the possibilities of increasing the goose liver weight, there are also opinions available about the effect of certain materials and methods but they are not confirmed by exact examinations. Therefore, the author made experimental trials with several materials and methods in the Institute for Animal Nutrition of the University for Agricultural Sciences always with geese deriving from one and the same gander, brought up in equal surroundings in the same community, and stuffed with soaked maize twice daily during 5 weeks.

Author established the fact that a solution of coppersulphate, or alcohol, or an increased dose of common salt does not influence the size of liver. Geese consuming daily 8-12 g salt, utilized their food 3.12 per cent better and their fat proportion was also better.

He also studied the inheritance of liver-size of the individuals of 5 goose families. There was an important difference between their liver-size (10.5-5.4 per cent of body weight) and the fat quantity (40.8-35.1 per cent of body weight).

From this he concluded that the liver growing capacity is a constitutional and heritable feature.

On the basis of the dissection data of 100 geese he shares the opinion of others that the fattened goose liver grows in proportion with the body weight. The most advantageous liver is that of geese 8-10 kg weight. (Hungarian Agricultural Review 2, 1956)

BONADONNA, T., and G. C. POZZI, 1955. [Ist Sper. Ital. "L. Spallanzani" Fecond. Artif., Milan.] Osservazioni sull'azione del fattore luce nei riguardi della produzione spermatica nel "Gallus gallus".
THE EFFECT OF LIGHT ON SEMEN PRODUCTION IN *GALLUS GALLUS*. *Zootec. e Vet., 10:* 43-61. [English summary].—During Jan.-April 2 cocks were kept in darkness and 2 under the continuous illumination of a 200-watt lamp; semen production was reduced by 40 and 25% resp. There were also reductions in body and testis weight and an increase in the number of abnormal spermatozoa. Histological changes in the testis are described and illustrated. (Animal Breeding Abstracts)

BRARD, E. 1953. [Coll. France, Paris.] Action de la testostérone sur des poules en ponte.

THE EFFECT OF TESTOSTERONE ON LAYING HENS. *C.R. Soc. Biol. [Paris], 147:* 1943-1946.—Prolonged injection of large doses of testosterone did not modify any secondary sexual characters. Egg production was curtailed slightly by the injection of very large doses for 3 wks. but secondary sexual characters were not affected. (Animal Breeding Abstracts)

BRARD, E., and J. BENOIT. 1953. Action de la testostérone sur la créte de la poule avant et après ovariectomie.

THE EFFECT OF TESTOSTERONE ON A HEN'S COMB BEFORE AND AFTER OVARIECTOMY. *C. R. Soc. Biol. [Paris],* 147: 1940-1943.—Prolonged injection of a Brown Leghorn hen with testosterone during sexual quiescence reduced ovary size considerably but did not affect comb size or type. The comb became ♂ in type when testosterone injections were continued after ovarietomy. (Animal Breeding Abstracts)

COOPER, D. M., and G. SKULSKI. 1955. [Anim. Health Trust. London.]

THE EFFECT OF THE CONTINUOUS FEEDING OF FURAZOLIDONE ON THE GROWTH OF GONADS IN SINGLE COMB WHITE LEGHORN COCKERELS. *Vet. Rec., 67:* 541.—As the addition of this drug to the chick ration is useful in the treatment and prevention of *Salmonella gallinarum* and *S. pullorum*, experiments were made at the Poultry Research Station of the Animal Health Trust to test its effect in other directions. Fed in the mash for 12 wks. at levels of 0.005 to 0.2% there was no adverse effect on body weight. However, testis weight was significantly reduced at the 0.02% level, and at the lowest level spermatogenesis was retarded. Until more is known about the duration of the effect of furazolidone on gonad development, the drug should be used with caution if breeding stock are involved. (Animal Breeding Abstracts)

DAS, B. C., and A. V. NALBANDOV. (U. Illinois, Urbana.)

RESPONSES OF OVARIES OF IMMATURE CHICKENS TO AVIAN AND MAMMALIAN GONADOTROPHINS. *Endocrinology 57(6):* 705-710. 1955.—Transformation of follicles, from microscopic to macroscopic size including yolk formation could be induced by the administration of chicken pituitaries to intact or hypophysectomized prepuberal female chickens. In contrast, follicular development could not be caused by mammalian gonadotropin in either intact or hypophysectomized prepuberal or mature females. Exogenous mammalian gonadotropins did induce follicular development in females approaching sexual maturity. Gonadotropins of either source could act on the medullary portion of the ovary, causing an increase in ovarian weight and in comb growth. The refractory condition of the cortical portion of the immature chicken ovary is not due to morphological or physiological unreadiness to respond to gonadotropic hormones but is probably due to a qualitative inadequacy of the mammalian pituitary gonadotropic complex. (Biological Abstracts)

FRAPS R. M. (Agric. Res. Service, U.S.D.A., Beltsville, Maryland), **and H. L. FEVOLD.**

DELAYING ACTION OF GONADOTROPHINS ON OVULATION IN THE HEN. *Proc. Soc. Exptl. Biol. and Med. 90(2):* 440-446. 1955.—Antiadrenergic, anticholinergic or central depressant drugs suppress or delay, in varying proportions, ovulation of the 2d or C_1 follicle of the hen's sequence following their administration 18-20 hours before normally expected ovulation. To counteract these effects, a whole anterior pituitary (AP) preparation from cocks was injected intramuscularly shortly before injection of several of the drugs. Incidence of suppressed ovulations was increased by AP preparation, and increased proportions of suppressed ovulations exhibited C_1 lapses. Intramuscularly injected 18-19 hours before expected C_2 ovulations, the AP preparation alone suppressed ovulation in most hens, with a high propor-

tion of C_1 lapses. Under similar conditions, lutenizing hormone (LH) or follicle stimulating hormone (FSH) from cock pituitaries suppressed ovulation in some hens. Administration of 0.02 mg LH + 2 mg FSH/hen suppresesd ovulation in 93% of injected birds, and all of these exhibited the C_1 lapse. Progesterone injected at about the hour of normally expected release of ovulation-inducing hormone (OIH) effected ovulation in most hens previously treated with the AP preparation, indicating that gonadotropin-induced lapses resulted from a transient "blockade" of the nervous mechanism controlling OIH release.—*R. M. Fraps.* (Biological Abstracts)

GLEICHAUF R. 1955. [BundesforschAnst. Kleintierz., Celle.] Hormonisierungsversuche mit Hähnen und Hennen der kennfarbigen Italienerrasse.

EXPERIMENTS ON THE ADMINISTRATION OF HORMONES TO LEGBAR COCKERELS AND HENS. *Arch. Geflügelk., 19:* 369-374. [English summary.]—Six castrated cockerels regularly injected subcutaneously with 0.5 cm.^{3} oestrogen (Foragynol) took on a more or less feminine appearance. [Duration and frequency of treatment are not specified.] The colour and form of their feathers changed to the henny type but the typical ♂ barring pattern was not affected.

When 10 young ♀♀ were injected intramuscularly at 4-wk intervals for 9-10 mths. with 5 mg. ♂ sex hormone (Testoviron-Depot Schering) their plumage remained typically female. The sex-linked barring factor of the Legbar is thus unaffected by hormone treatment. (Animal Breeding Abstracts)

GONZAGA, A. C. and R. N. NANADIEGO. 1955. [Coll. Vet. Med., Univ. Philippines Quezon City.]

STUDIES OF SOME EFFECTS OF THYROPROTEIN ON GROWING CHICKENS. *Indian vet. J., 32:* 207-218.—Twenty New Hampshire and 20 White Leghorn chicks of both sexes were fed a mash containing 0.02% thyroprotein from the 6th to the 24th week of age; 10 chicks of each breed served as controls. Thyroprotein slightly stimulated feather growth. During the first 3 wks. the control birds had a heavier av. weight than the experimental birds, but from then on the reverse was the case. Thyroprotein had a stimulating effect on the growth of the N.H.s but a depressing effect on that of the W.L.s. Three 12-, four 18-, and two 24-wk-old cockerels were slaughtered: the dressed carcass weights of treated birds were on an average 8.26, 2.09, and 0.92 g. heavier at the 3 ages resp.; comb and testes weights were lighter in the 12th and 18th weeks but heavier in the 24th week. Thyroprotein induced early maturity in the pullets, some coming into lay in the 24th week. Experimental birds had a higher mortality rate than controls. (Animal Breeding Abstracts)

HELDER, J. F. [1955.] Over de nawerking van de bevruchting na het vervangen van de haan.

ON THE CONTINUANCE OF FERTILIZING ABILITY AFTER THE REPLACEMENT OF ONE COCK BY ANOTHER. *Meded. Rijksinst. Pluimveeteel [Beekbergen]*, No. 60: 11 pp. [English summary.]—In White Leghorn and North Holland Blue breeding pens, cocks of the pullets' breed were replaced by N.H.B. and W.L. cocks resp. Purebred chicks continued to be produced for up to 17 days after the change of cocks. Thirteen to 30% of the chicks from eggs hatched between the 9th and the 17th day were sired by the first cock. It is recommended that eggs should not be saved for incubation until 2-3 wks. after replacing the cock. The period of 9 days recommended by F. B. Hutt of Cornell University is considered to be insufficient to ensure that all chicks are sired by the second cock. (Animal Breeding Abstracts)

HERRICK, E. H., and EARL M. HERRICK. (Kansas State Coll., Manhattan.)

RIB ABNORMALITIES IN FOWLS. *Poultry Sci. 35(1):* 191-194. 1956.—Of 522 White Leghorn and Leghorn x heavy breed cross chicks

examined, 10.4% were regarded as having abnormal rib development. Among these 41.7% had incomplete 7th ribs and 58.3% had at least portions of 8th ribs. The number of vertebrae was the same in normal and abnormal chicks. Males and females showed no significant difference in the frequency of rib abnormalities. Variations in rib structure were not always bisymmetrical in arrangement.—*E. H. Herrick,* (Biological Abstracts)

HOSODA, T., T. KANEKO, K. MOGI, and T. ABE. 1954. 1955. SEROLOGICAL STUDIES ON EGG PRODUCTION IN FOWLS. III. EFFECT OF THYROXINE ON VITELLIN PRODUCTION. IV. RELATION BETWEEN VITELLIN PRODUCING ABILITY IN OESTROGENISED CHICKS AND THEIR EGG LAYING AFTER MATURATION. *Bull. nat. Inst. agric. Sci.* [*Chiba*], *G,* No. 8: 95-99; No. 10: 119-124. [Japanese with English summaries.]—III. Thyroxine was found to suppress serum vitellin production.

IV. Daily intramuscular injections of 0.50 mg. oestrogen were given for 10 days to 30-day-old immature pullets. The response in serum vitellin production was tested on the 7th and the 10th day following the 1st injection. No significant correlation was found between the production of serum vitellin and age at sexual maturity or egg production. The oestrogenised pullets had a slower growth rate for about 2 mths. from the start of the injections; thereafter the growth rate increased, and at maturity the oestrogenised birds were heavier than untreated controls. There was no difference between the treated and untreated birds in egg yield.—Abstract of summaries. (Animal Breeding Abstracts)

HOSODA T., T. KANEKO, K. MOGI, and **T. ABE** ·(Nat. Inst. Agric. Sci. Chiba-Shi, Japan)
EFFECT OF GONADOTROPIC HORMONE ON OVARIAN FOLLICLES AND SERUM VITELLIN OF FASTING HENS. *Proc. Soc. Exp. Biol. Md. 88:* 502-504, 1955.—1. Follicular atresia begins in the ovary of the starving hen on the second day of starvation, and in about a week the whole ovary becomes atretic. Concurrently, serum vitellin decreases and disappears completely around the 7th day of starvation. Both these changes were prevented by daily administration of 0.5 Cartland-Nelson Unit of gonadotropic hormone.

2. These findings were interpreted to indicate the following sequence of events: starvation decreases the production of GTH by the pituitary, this induces atresia and the decreased release of estrogen, the latter decreases the formation and the release of serum vitellin by the liver. *(Authors)*

KARAPETJAN, S. K. 1955. Novye fakty o gonadostimulirujuscem vlijanii sveta.
NEW FACTS ON THE GONAD-STIMULATING EFFECT OF LIGHT. *Dokl. Akad. Nauk SSSR, 103:* 525-528.—From Nov. 1953 to April 1954 three ♂ and 8 ♀ guinea-fowl were subjected to light for 16 hrs. per day and 3 ♂♂ and 8 ♀♀ in normal light served as controls. Production lasted 7 mths. in the experimental birds and 4 mths. 10 days in the controls; the former began laying 20 days earlier and continued laying 47 days longer. They produced 80.2 eggs, which was 40% more than the controls. Live weight and egg weight did not differ appreciably between the groups; survival was 100% in both groups. Similar results were obtained when the experiment was repeated in Nov. 1954-April 1955 with birds hatched in the previous year. The sexual and other organs of the ♂ and ♀ experimental birds were larger than those of the controls. Eggs laid before the normal season were not fertile. (Animal Breeding Abstracts)

KOSINKI, S. 1955. [Dep. Gen. Anim. Breed., Chief Agric. Coll., Warsaw.] Nowa metoda sztucznego unasieniania indykow.
A NEW METHOD FOR THE ARTIFICIAL INSEMINATION OF TURKEYS. *Med. wet., 11:* 682-684.—The apparatus used in the collection of semen and in the insemination of turkey hens is described

and illustrated by diagrams. Ejaculation is brought about by the difference between the pressure within the apparatus and that within the seminal vesicles of the turkey caused by squeezing and then gently releasing a pear-shaped rubber bulb attached to that part of the apparatus which is inserted into the cloaca. The time taken to collect the semen does not usually exceed 1 min. Where difficulty is experienced in inducing ejaculation a "teaser" turkey hen may be used.

The percentage of fertile eggs was much higher in birds artificially inseminated by the method described than in control birds which mated naturally. In 3 comparable groups the percentage of fertile eggs obtained by A.I. was 69.7%, 90.0% and 92.8% *v.* 18.0%, 30.1% and 30.0% for eggs from naturally mated controls. (Animal Breeding Abstracts)

KOSTROVA, L. A., and **V. I. CAVCANIDZE.** 1955. [All-Un. Poult. Industr. Res. Inst., Tomilin Hatchery.] Osobennosti linjki kur —kletocnyh nesusek.

CHARACTERS OF THE MOULT IN HENS—BATTERY-CAGE LAYERS. *Dokl. Akad. seljskohoz. Nauk Lenin., 20(1):* 40-43.—From 1st Sep. 1951 to 1st Sep. 1952, 86 Leghorns hatched in March 1951 were kept in individual battery cages and subjected to 14 hrs.' light per day. Flight feathers only moulted in 53% of the birds and feathers from all areas in 37.5%; no flight feathers moulted in the remaining 9.5%. In hens moulting only flight feathers, egg production was not interrupted and was only 7% lower than that of hens not moulting. In hens moulting feathers from all parts, egg production diminshed or was interrupted during the moult, and total production was reduced by 28%. It is concluded that at 14-15 mths. hens in individual cages may be culled on the basis of a general moult. (Animal Breeding Abstracts)

KURBATOV, A. D. 1955. Vlijanie podsadki tkanei no sootnosenie polov v potomstve kur.

THE EFFECT OF TISSUE TRANSFER ON THE SEX RATIO OF CHICKS. *Dokl. Akad. Nauk SSSR, 103:* 731-732.—Using Leghorns, tissue from adult hens and cocks or 8- to 9-day embryos were minced fresh or after preserving for 8 days, and injected subcutaneously into hens. When eggs were set several days after the 1st or 2nd injection, the sex ratio of the chicks was not appreciably different from that of the controls; when the eggs were set 31 or more days after the 2nd injection, the sex ratio was in favor of ♀♀. Subsequent egg production of the daughters of the treated hens was higher than that of daughters of the untreated controls. It is suggested that production could be further increased by using tissue from birds of a different breed to that of the recipient. (Animal Breeding Abstracts)

KUSNER, H. F., and **E. V. PANFILOVA,** 1955. Redkii slucai odnojaicevoi dvoni u kur.

A RARE CASE OF MONOVULAR TWIN FOWLS. *Z. obsc. Biol., 16:* 248.—In March 1955 at the Institute of Genetics of the Academy of Sciences twin ♀ chicks were noted in a single-yolk egg weighing 54 g. The chicks were at the 18.5-19th day of incubation and were covered with yellow down with light markings. They were normally developed, and were very similar; together they weighed 31 g. The egg was laid by a crossbred pullet mated with a New Hampshire cock. (Animal Breeding Abstracts)

MAZZONI, R. 1955. La capponatura incruenta nella pratica e nelle ricerche italiane sull'incremento ponderale e sullo scheletro.

FATTENING POULTRY, BLOODLESS CAPONIZATION IN PRACTICE AND IN ITALIAN INVESTIGATIONS INTO WEIGHT INCREASE AND THE SKELETEON. *Ital. agric., 92:* 803-808.—Live weight of 21 cockerels given monthly implants of 10 to 20 mg. proprietary oestrogen (Estrofix) for 6 mths. was 85-185 g. greater than that of controls, but 50-150 g. less than that of birds caponised surgically. The optimum monthly dose was shown to be 15 mg. Results of sketetal measurements and carcass analyses of treated, surgically caponised, and control birds are tabulated. (Animal Breeding Abstracts)

MICEK, J. 1955. [Biol. Inst., Czechoslovak Acad. Sci., Prague.] Vyber kurciat podl'a pohlavia vo stvrtom dni embryonalneho vyvoja pri presvieteni vajec.

SEXING CHICKS BY CANDLING ON THE FOURTH DAY OF EMBRYONIC DEVELOPMENT. *Pol'nohospodárstvo [Bratislava], 2:* 313-320. [Russian and German summaries.]—After preliminary work by which the parts of 42 Leghorn eggs were measured on the 4th day of incubation, a simple practical method of sexing is described. On candling, ♀♀ have a rounder yolk sac wtih its axis perpendicular to the length of the embryo; the 2 halves of the yolk sac are equal or the left is slightly larger. The yolk sac of ♂♂ is elliptical with the long axis parallel to that of the embryo; the right half of the sac is larger than the left.—Abstract of summaries. (Animal Breeding Abstracts)

NEAL, WAYNE M.

CONCERNING THE HEN'S OVULATORY CYCLE. *Poultry Sci. 35(1):* 238-239. 1956.—The occurrence of asynchronous cycles (Bastian and Zarrow) is supported. Abnormal occurrences in the cycle are cited to show lack of influence of the oviduct on the cycle. Mechanical stimulation is deprecated as a cause of secretion of the non-yolk portion of the egg.—*W. M. Neal.* (Biological Abstracts)

NICHOLS, C. W. Jr., STUART LINDSAY, and **I. L. CHAIKOFF.** (U. California Sch. Med., Berkeley.)

PRODUCTION OF ARTERIOSCLEROSIS IN BIRDS BY THE PROLONGED FEEDING OF DIHYDROCHOLESTEROL. *Proc. Soc. Exptl. Biol. and Med. 89(4):* 609-613. Illus. 1955.—Feeding a diet containing 0.5% dihydrocholesterol (DHC) for 6 months resulted in the development of severe arteriosclerosis of the thoracic and abdominal aortas in 125 birds. The aortic lesions seen were identical with those induced in the bird by feeding cholesterol, and appeared to have resulted from deposition of dihydrocholesterol in the vascular wall. Hepatic enlargement in DHC-fed birds was similar to that seen previously in cholesterol-fed birds, and was due in part to reticuloendothelial storage of dihydrocholesterol.—*From auth. summ.* (Biological Abstracts)

OBENKO, K. S. 1955. [State Farm "Vency-Zarja", Krasnodarsk Territory.] Interjer cisto-porodnyh i pomesnyh kur.

THE CARCASS OF PUREBRED AND CROSSBRED HENS. *Pticevodstvo, 5(3):* 36-37.—Carcass composition was studied in 22 Leghorns and 21 Leghorn×New Hampshire×Australorp crossbreds. Meat represented 45.9% of the live weight of the former and 48.2% of the latter; bone represented 16.4 and 18.8% rsp. The organs of the crossbreds were absolutely and relatively larger than those of the purebreds. (Animal Breeding Abstracts)

ONISHI, N., M. TAKETOMI, and **Y. KATO.** 1954. 1955.

STUDIES ON FEATHERING IN THE FOWL. I. OBSERVATIONS ON NORMAL FEATHERING IN CHICKS. II. THE INTERRELATIONSHIP BETWEEN THE TYPES OF MOULT AND THE RELATION BETWEEN MOULT TYPE AND EGG PRODUCTION. *Bull. nat. Inst. agric. Sci [Chiba], G,* No. 9: 9-20; No. 10: 63-77. [Japanese with English summaries.]—I. Observations on feathering up to 221 days were made on 146 chicks of various breeds (including S.C. White Leghorn, Mikawa, Barred Plymouth Rock and R.I.R.) hatched in April-June at the National Institute of Agricultural Sciences, Chiba. The time of emergence of the feathers on different parts of the body is indicated. As a rule, feathering was more rapid in ♀♀ than in ♂♂. In the early-feathering breeds the emergence and renewal of the primaries and axial feather gave a better indication of age than did body weight. In the late-feathering breeds the relationship between age and the feathering process was largely obscured by individual differences in feathering.

II. In a flock of S.C. White Leghorns consisting of several inbred families and some crosses between them almost no relationship was found between the duration of moult and egg production. Late moulting

Cause	Name	Tracheal lesions	Breathing	Other symptom
I. Virus	1. Fowl pox	Rare	Normal exc. in diphtheritic type	Pox lesions wattle eyelids. Membra mouth, tongue,
	2. Infectious laryngo-tracheitis	*Blood and clots	Coughing, rattling, outstretched he neck, open beak. Coughing blood s in pen. Cyanosis and suffocation	
	3. Newcastle disease	None or slight	Coughing, sneezing	*Coughing, cyano diarrhoea. Sudd
				†Drop in egg yiel mal eggs. Nervo toms (head and
	4. Infectious bronchitis	None or slight	Sneezing. Difficult breathing. Crackling in chicks	Drop to cessatio yield. Grossly a shelled eggs in
II. Bacterial	1. Infectious coryza *(Haemophilus gallinorium)*	None	Sneezing and head-shaking, closed eyes	Poor condition. L egg and weight
	2. Chronic respiratory disease (P.P.L.O.)	None	Coughing and rattling	Loss in weight ga egg yield
	3. Infectious sinusitis (P.P.L.O.)	None	Sneezing and difficult breathing	Swollen face. Em
	4. Pullorum disease *(S. pullorum)*	No	Difficult breathing	Diarrhoea
	5. Fowl cholera *(P. avisepticus)*	No	Laboured	Swollen wattles, sudden death
III. Fungal	Aspergillosis	No	Laboured	None
IV. Nutritional	Avitaminosis "A" (nutritional group)	No	Laboured	Poor feathering. growth. Emacia

†Chronic * Acute

** (Continued from page 300)

F AVIAN RESPIRATORY DISEASES (Cont'd.) **

nptoms	Carriers	Diagnosis	*Post-mortem* examination	Control
vattles, comb, nbranes rue, palate	No	Clinically innoculated chick embryos or susceptible fowl	As for symptoms. Membranes adherent	Pigeon pox or fowl pox live virus vaccines by scarif. or stab.
d head and od splashes ion	Yes, over one year	As above	*Blood and casts in trachea †Necrotic material larynx, trachea	Live virus vaccine applied to cloacal membrane in some countries
yanosis. Green Sudden death yield). Abnor-Nervous symp- and neck)	Probably not	H.I. test. Isolation virus in embryos and neutralisation tests. Inoculated susceptible fowl	Haemorrahage Proventriculus ulcers	Scheduled disease in Great Britain, var. vaccines in other countries
sation of egg ly abnormal in adults	Yes	Embryos inoculation dwarfing. Serum neutralisation	Slight necrotic material or clouding in air sacs in chicks	Live vaccines. Spray application
n. Loss in ight gain	Yes	Clinically smears and cultures	Caseous material in sinus and mouth yellow and loose	Sulphonamides. ? Furazolidone
t gain and	Yes	Clinically, smears, tissue, cultures	Caseous material in sinus air sacs, heart and liver	Antibiotics i.m. and dietary (high level)
Emaciation	Yes	As above	Caseous material in sinus and occasional air sacs	Antibiotics i.m. intrasinus and dietary (high level)
	Yes	Cultures	Nodules ht. lungs, liver, etc.	Blood test furazolidone
les, cyanosis, h	Yes	Cultures	Necrosis, lungs, caseous material in wattles	Oxytetracycline i.m.
	No	Cultures	Nodules in lungs and air sacs	? Penotrane on litter
ing. Poor aciation	—	Clinically	White cast in eyes and sinus pustules, gullet and oesophagus	Vitamin A

appeared to be one of the characteristics of heavy layers, since the late moulters tended to have greater persistency and a less marked winter pause. Hens which still carried the juvenile primary feathers at sexual maturity generally had earlier sexual maturity and greater persistency in egg laying than those which did not.—Abstract of summaries. (Animal Breeding Abstracts)

POLIN DONALD (Merck Inst. Therap. Res., Rahway, N. J., and **PAUL D. STURKIE.** (Rutgers U., New Brunswick, N. J.)
PREVENTION OF PREMATURE OVIPOSITION AND SHELL-LESS EGGS WITH EPHEDRINE. *Poultry Sci. 34(5):* 1169-1170. 1955.—One hen consistently laid premature eggs without shells. Each time 100 mg. of ephedrine sulfate were given when a soft egg was in the uterus an egg with a shell was laid. This case may exemplify others in which shell-less eggs are caused by premature oviposition rather than a defective mechanism of Ca deposition.—*D. Polin.* (Biological Abstracts)

PORTER, CURT C. and **JAMES L. GILFILLAN.** (Merck Inst. Therap. Res., Rahway, N. J.)
THE ABSORPTION AND EXCRETION OF ORALLY ADMINISTERED NICARBAZIN BY CHICKENS. *Poultry Sci. 34(5):* 995-1001. 1955—Nicarbazin, an equimolar complex of 4,4'- dinitrocarbanilide (DNC) and 2-hydroxy-4,6-dimethylpyrimidine (HDP), is absorbed through the intestinal wall of the chicken. From the complex, HDP is absorbed less rapidly and DNC more rapidly than when the components are fed singly or as a mixture. Concentrations of DNC found in blood plasma are proportional to concentrations of nicarbazin in the diets, and to therapeutic effectiveness against cecal coccidiosis. Forty-eight hours after withdrawal of medicated feed, no drug could be detected in blood or tissues of treated birds.—*C. C. Porter.* (Biological Abstracts)

RUBAJ, B. 1955. [Inst. Path. Anat., Vet. Dep. Lublin.] Podwojenie jadra prawego u koguta.
DUPLICATION OF THE RIGHT TESTIS IN A COCK. *Med. wet.*, 11: 50-51.—In a 6- to 7-mth-old cockerel the right testis was composed of separate parts held together by the epididymis. In cross section both parts appeared to be histologically normal. The cockerel was physically better developed than normal and had early shown signs of a strong sexual drive. It was culled by its owner on account of its aggressive behaviour towards other cockerels of the same age. (Animal Breeding Abstracts)

TAKEDA, A. 1954. [Lab. Zootech., Kyushu Univ.]
ON THE DURATION OF LIFE OF COCK SPERMATOZOA *IN VITRO*, AND THEIR PRESERVATIVE FLUIDS. *Sci. Bull. Fac. Agric. Kyushu Univ., 14:* 595-599. [Japanese with English summary.]—In undiluted cock semen obtained by abdominal massage the spermatozoa survived, on an average, for 156 hrs. at 0° C., for 96 hrs. at 7-10° C., and for about 10 hrs. at 40° C. The longest duration of life at 0° C. was 288 hrs. Dilution of the semen with gluco[se]-egg yolk-citrate or with albumen-gluco[se]-phosphate significantly increased survival of the spermatozoa, but physiological salt solution, Ringer's, Ringer-Locke's and glucose solutions were found to have an adverse effect on viability.—Abstract of English summary. (Animal Breeding Abstracts)

TANGL H. The effect of Syntestrine on the growth and metabolism of poultry. (A sintestrin hatása a baromfiak növekedésére és anyagcseréjére) Allattenyésztés, Budapest. 4: 367-372, 1955.
When, in order to avoid oestrum female piglets were treated with a rather large dose of syntestrine (30 mg) no disturbance whatsoever appeared in their development, although the opinion prevails that if the activity of the thyroid glands decreases, the development of the organism will also remain below the standard. In order to clear the contrast existing between the experience acquired in dosing syntestrine on the

one hand and the theoretical conclusions on the other, it seemed desirable to accomplish experiments for this purpose.

In order to examine the cooperation of the ovary, the pituitary and the thyroid glands, 120, two weeks old Hungarian white chickens were divided into two groups. One of the two groups got 10 mg syntestrine injections in intervals of five weeks. Respiration experiments were also accomplished on four occasions with twenty chickens at every turn, by means of the Benedikt-Knipping circulation apparatus.

In the course of the 10 week experiment the injected great quantity syntestrine had no inhibiting effect at all on the development of the animals and the birds of the two groups developed equally.

The effect of the injections caused a temporary increase of oxygen consumption of the chickens and at the same time also of calory production.

Consequently in opposition to the prevailing assumption the effect of dosed syntestrine does not reduce but increases at least temporarily by the mediation of the pituitary gland, the function of the thyroid glands—(Hungarian Agricultural Review 2. 1956)

TIHOMIROVA, M. M. 1955 [Zdanov State Univ., Leningrad.] Pol potomstva v svjazi s intensivnostjju osnovnogo obmena vescestv u kur.

THE SEX OF PROGENY IN RELATION TO THE INTENSITY OF BASAL METABOLISM IN THE FOWL. *Pticevodstvo, 5(8):* 38-39.—In 1953-54 at the Animal Genetics Laboratory 6 series of experiments were carried out with Leghorns. When hens with a low basal metabolic rate were mated to cocks with a high B.M.R., there were 115 ♂ per 100 ♀ chicks, whereas there were 79 ♂ per 100 ♀ chicks with the reciprocal matings. When both parents had a high B.M.R., there were 89 ♂♂ per 100 ♀♀, and when both parents had a low B.M.R., there were 114 ♂♂ per 100 ♀♀. When ♂♂ with a high B.M.R. were used, 94.6% of the eggs were fertile v. 88.5% when the ♂♂ had a low B.M.R. (Animal Breeding Abstracts)

TSUDA, S., R. ODA, and **TANGE, M.** 1955. [Lab. Zootech., Kyushu Univ.] STUDIES ON THE PHYSIOLOGY OF REPRODUCTION IN BIRDS. III. ON THE EFFECTS OF OESTROGEN ON THE DEVELOPMENT OF THE MALE REPRODUCTIVE ORGANS IN THE CHICK. *Sci. Bull. Fac. Agric. Kyushu Univ., 15:* 101-112. [Japanese with English summary.]—Oestridiol benzoate (50,000-500,000 I.U.) was injected into the breasts of Barred Plymouth Rock hens mated with R.I.R. cocks about 36 hrs. before the next egg laying was expected, and in another experiment, 2000-10,000 I.U. were injected into the albumen of eggs which had been incubated for about 4 or 5 days. All the ♂ embryos (distinguished by down colour) were examined for changes in the reproductive organs. In both experiments the left testis was noticeably altered by oestrogen treatment. It appeared most often as a flattened ovary-like body and had ovarian cortex in the periphery of the testicular tissues. When the hormone was injected intramuscularly into the ♀ fowl, the sex ratio of embryos surviving to the 19th day of incubation was 68 ♀♀ : 32 ♂♂.—Abstract of summary. (Animal Breeding Abstract)

VISSCHEDIJK, A. H. J., and **J. W. Kulper,** 1955. [Res. Inst. Anim. Husb., Organ. Appl. Sci. Res., Utrecht] Uber die Fehllage des Hühnerembryos im Ei.

MALPOSITION OF THE EMBRYO IN HENS' EGGS. *Arch. Geflügelk., 19:* 73-86. [English and French summaries.]—961 embryos which died after the 16th day of incubation were divided into 7 main groups according to their position in the egg. Fewer abnormal embryos occurred in eggs which had been turned hourly than in those turned 3 times every 24 hrs., but the difference did not quite reach significance. The relative seriousness of the various types and combinations of malpositions is indicated. (Animal Breeding Abstracts)

ZIOLO, T. 1955. Przypadek jaja w jaju (ovum in ovo) u kury. A CASE OF AN EGG WITHIN AN EGG (*OVUM IN OVO*) *IN* THE HEN. *Med. wet., 11:* 112-113.—Of 11 eggs from the same hen, 10 were double-yolked and one had a second egg inside it. The outer of the 2 eggs consisted only of shell, shell membrane, air space and albumen. The inner egg contained all the usual egg components and did not greatly differ from a normal egg except in having a much thinner shell and less albumen. The inner and outer eggs together weighed 112 g. The length of the double egg was 73.2 mm. and its breadth 55.1 mm. The inner egg weighed 50 g. It was 50 mm. in length and 42 mm. in breadth. (Animal Breeding Abstracts)

NUTRITION

ADAMS, JOHN L. (U. Wisconsin, Madison.) THE EFFECT OF RATION, CAPONIZING AND HORMONE TREATMENT ON BROILER STRAIN NEW HAMPSHIRE COCKERELS. *Poultry Sci. 34(6):* 1295-1297. 1955.—Comparisons between a 1936 ration and a 1951 broiler ration to 16 weeks of age using a current broiler strain showed that the birds grew 20% better on the 1951 ration. The current broiler strain grew 24% better on the 1936 ration than did heavy breeds grown in 1935 and 1936. Surgical caponizing did not improve growth of the broiler strain when fed the 1951 broiler ration, however, caponizing did make a 12.5% improvement in growth in birds on the 1936 ration. Caponetting (hormone-pelleting) gave 10% and 12.5% improvement on new and old rations, respectively, and markedly improved conformation and finish on both rations. It appears that surgical caponizing produces little benefit in birds killed at 17 weeks of age unless a premium price is paid for capons. Hormone pelleting appears to be profitable with modern rations since pelleted birds were superior to both capons and cockerels in weight and carcass quality at 17 weeks of age.—*J. L. Adams.* (Biological Abstracts)

ALMQUIST H. J. (The Grange Company, Modesto, California.) UTILIZATION OF AMINO ACIDS BY CHICKS. *Arch. Biochem. and Biophys. 52(1):* 197-202. 1954.—Reports on the contents of amino acids in chick blood are reviewed in reference to intake and requirements. Amino acid levels in blood are closely related to those in diet. A surplus or deficiency of intake is reflected in blood content of amino acid to an exaggerated degree. These observations are consistent with the concept of definite proportions in amino acid requirement and removal from blood for tissue protein synthesis.—*H. J. Almquist.* (Biological Abstracts)

ALMQUIST, H. J., and J. B. MERRITT. (Grange Co., Modesto, Calif.) WHOLE BARLEY COMPARED TO HULLED BARLEY FOR TURKEYS ON RANGE. *Poultry Sci. 34(6):* 1449. 1955.—When given the same limited mash allowance and free access to barley grain, turkeys selected hulled barley as compared to whole barley in the inverse proportion of energy values of the 2 forms. With free access to both mash and grain, turkeys ate more hulled barley and less mash as compared to birds fed whole barley.—*H. J. Almquist.* (Biological Abstracts)

ANDERSON, J. O., J. S. HURST, D. C. STRONG, H. NIELSEN, D. A. GREENWOOD, W. ROBINSON, J. L. SHUPE, W. BINNS, R. A. BAGLEY and C. I. DRAPER. (Utah State Agric. Coll., Logan.) EFFECT OF FEEDING VARIOUS LEVELS OF SODIUM FLUORIDE TO GROWING TURKEYS. *Poultry Sci. 34(5):* 1147-1153. 1955.—Ten and 12-week old Broad Breasted Bronze turkeys were fed rations containing from 43 to 1600 ppm of fluoride (F) for 16 weeks. Performance of turkeys was not influenced by F levels up to 100 ppm. Weight gained by male turkeys was decreased by as little

as 200 ppm of F in ration. Between 400 and 800 ppm is a more critical F level for turkeys. Increasing the ration F from 400 to 800 ppm produced (a) marked decrease in weight gained by male turkeys, (b) decrease in weight gained by female turkeys, (c) decrease in feed consumption, (d) decrease in feed efficiency, (e) more than 2-fold increase in F content of soft tissues, and (f) gross changes in the intestinal tract of the turkeys. The F content of bones was increased as the rations were fed increased.—*J. O. Anderson.* (Biological Abstracts)

BALDINI, J. T., and **HANS R. ROSENBERG.** (E. I. du Pont de Nemours, Stine Lab., Newark, Del.)
THE EFFECT OF PRODUCTIVE ENERGY LEVEL OF THE DIET ON THE METHIONINE REQUIREMENT OF THE CHICK. *Poultry Sci. 34(6):* 1301-1307. 1955.—Experiments (3) were conducted which demonstrate that the methionine requirement of the chick, expressed as per cent of diet, is not a fixed value, but varies as a linear function of the productive energy content of the diet. On the basis of these 3 experiments and 50 other diets used in methionine experiments an estimate of the methionine requirement of the chick receiving diets containing 800-1000 calories of productive energy per pound was made. The requirement is expressed as $Y = 0.000736\ X + (-\ 0.2269)$ (X = productive energy level of the diet and Y = methionine requirement). The formula given must be used with the productive energy and methionine values of feeds used by the authors.—*J. T. Baldini.* (Biological Abtracts)

BIELY, J., R. E. MARCH, and **H. L. A. TARR.** (U. British Columbia, Vancouver, Canada.)
THE NUTRITIVE VALUE OF HERRING MEALS 3. THE EFFECTS OF HEAT TREATMENT AND STORAGE TEMPERATURE AS RELATED TO OIL CONTENT. *Poultry Sci. 34(6):* 1274-1279. 1955—In experiments with chicks, the nutritive value of herring meal was not improved when the oil was removed by extraction with hexane. This was true of commercial flame-dried herring meal and of a low temperature dried meal. When a low temperature dried herring meal was extracted with hexane the folic acid in the extracted meal was less stable than that in the original meal. The nutritive value of herring meals stored for 1 year at -25°, 21° and 37°C was apparently unaffected. The basal ration in which the herring meals were used was well fortified with both fat and water-soluble vitamins.—*J.Biely.* (Biological Abstracts)

BIRD, H. R. (U. of Wisconsin, Madison.)
"PERFORMANCE INDEX" OF GROWING CHICKENS. *Poultry Sci. 34(5):* 1163-1164. 1955.—"Performance index" equals gain per unit time multiplied by gain per unit feed, and provides a useful method of comparing responses to experimental diets.—*H. R. Bird.* (Biological Abstracts)

BOOTH, V. H., M. E. COATES. C. P. COX, S. Y. THOMPSON, and **M. J. R. HEALY.**
STABILITY OF CAROTENE FROM DRIED GRASS MEAL AND OF SYNTHETIC VITAMIN D_3 IN CHICK MASH. *J. Sci. Food Agric.*, 1955, 6, 10-14. [Dunn Nutrit. Lab., Milton Rd., Univ. Cambridge.] A mash for chickens was prepared by 7 compounders to their own recipes, but with about 5 per cent of dried grass and 1 I.U per g. of synthetic vitamin D^3 replacing the cod liver oil normally used. After 16 weeks' storage the average percentage loss of carotene from the dried grass was 8 and from the mash 13.5. In order to assess the antirachitic and vitamin A potency after 16 weeks' storage, 6 groups of 15 cockerels were given the mash unfortified or with 25, 50, 75 or 100 per cent of it replaced by the fortified mash. The sixth group received the fortified mash with 1 per cent cod liver oil. At the end of the experiment the tarsometatarsal distance was measured to determine the extent of rickets, and the vitamin A content of the liver was estimated chemically. Addition of only 25 per cent of the fortified to

the unfortified gave normal bone formation. The vitamin A content of the liver ranged from 10 I.U. in the birds receiving unfortified mash to 508 I.U. in those receiving it fortified.—*R. J. Ward.* (Nutrition Abstracts and Reviews)

BUNNELL R. H., L. D. MATTERSON, E. P. SINGSEN, L. M. POTTER, ANNA KOZEFF, and E. L. JUNGHERR. (U. Connecticut, Storrs.)
STUDIES ON ENCEPHALOMALACIA IN THE CHICK. 3. THE INFLUENCE OF FEEDING OR INJECTING VARIOUS TOCOPHEROLS AND OTHER ANTIOXIDANTS ON THE INCIDENCE OF ENCEPHALOMALACIA. *Poultry Sci. 34(5):* 1068-1075. 1955.—In studies using chicks from dams fed a semi-purified vitamin E-low ration, several antioxidants and tocopherols were compared by both oral administration and injection for their ability to prevent encephalomalcia in the chick. Results showed several antioxidants were as effective as diphenyl-p-phenylenediamine (DPPD). They are: 2,6-di-tertiary butyl-4-methoxy phenol (BHT); dibutyl and diamyl hydroquinones; di-sec-butyl-p-phenylenediamine; and 1,2-dihydro-2,2,4-trimethyl-6-ethoxyquinoline (Santoquin). Intramuscular injection of DPPD will prevent encephalomalacia, and, while not equivalent to vitamin E on a molar basis, it was nearly equivalent on a weight basis. By the injection route, delta-tocopherol is ineffective in preventing encephalomalacia, while gamma-tocopherol is nearly equivalent to alpha-tocopherol. It is tentatively concluded that DPPD is functioning as an in vivo antioxidant or electron-transferring agent in some cellular reaction which results in prevention of encephalomalacia. This explanation probably also applies to other effective antioxidants.—*L. D. Matterson.* (Biological Abstracts)

BURTON, H. W.
SORGHUM DOESN'T HARM CHICKENS. *Queensland Agric. J.*, 1955, 80, 221-224.—Experiments with day-old cockerels showed that large amounts of sorghum, up to 60 per cent of the ration, could be given without affecting growth rate. Feed efficiency was reduced, but this was offset by the lower cost of the sorghum compared with wheatmeal. A ration of 40 per cent sorghum and 20 per cent wheat was the most economical. Mortality rate was not affected.—J. S. Thompson. (Nutrition Abstracts and Reviews)

CAMP, A. A., H. T. CARTRITE, J. H. QUISENBERRY, and J. R. COUCH. (Texas A. and M. Coll. System, College Station.)
SUPPLEMENTARY VITAMIN A AND CHOLINE IN THE DIET OF THE GROWING CHICK. *Poultry Sci. 34(5):* 1134-1138. 1955.—Addition of a stabilized vitamin A concentrate to a high energy type broiler ration to replace 2.5% alfalfa meal significantly increased the growth rate and improved feed conversion. This study was carried out using 112 birds per group and the birds were reared on peanut hull litter. The addition of 400 mg of choline chloride per lb. of feed also produced an increase in growth. Addition of both stabilized vitamin A and choline chloride to the diet in the absence of alfalfa meal resulted in a highly significant increase in growth. The growth obtained in this group was significantly higher than that of the group receiving the choline chloride alone but was not significantly different from the weights of the groups fed stabilized vitamin A in the absence of alfalfa meal. Results of this study point to a possible function of choline in the utilization of carotene from alfalfa.—J. R. Couch. (Biological Abstracts)

CARLSON, C. W., W. KOHLMEYER, C. HENDRICK and R. A. WILCOX. 1956
EFFECTS OF ENERGY AND PROTEIN LEVELS AND ANTIBIOTICS ON GROWING TURKEYS. *S. D. Agr. Exp. Sta. Tech. Bull. 17,* April 1956.—Relatively high energy diets (850 calories of productive energy per pound) for growing turkeys from 12 to 28 weeks of age supported superior rates of growth compared to that of relatively low energy diets (675 calories of productive energy per pound). Feed effi-

ciency was from 10 to 25 percent better on the high energy diets, depending on the season and amount of green forage available. A greater degree of fleshing and finish was evident with the high energy diets. This was substantiated by the greater breast width measurements and the greater percent fat to percent water ratio obtained by skin analysis.

Antibiotics showed greater and more consistent advantages with low energy diets than with high energy diets under these conditions. Under conditions of environmental stress (cold weather) the value of antibiotics appeared to be greater. Using protein levels of either 16 or 19 percent in mash diets for turkeys from 12 to 24 weeks of age had little effect on growth rate. However, with pelleted feed that contained 19 percent protein, growth was more rapid than had been experienced before. Growth to 24 weeks of age was only slightly affected by energy level with either type of pelleted feeds but was significantly greater on high energy diets at 26 weeks of age. The high energy diet (57 percent corn—850 calories per pound) promoted cheaper gains than the low energy diet (62 percent oats—660 calories per pound) in 1955.

Diets with a calorie to percent protein ratio of 45:1 from 12 to 20 weeks of age, then widened to 58:1, produced satisfactory weight gains, feed efficiency, fleshing, and finish. The diets used had no great effect on dressing percentages except that hens fed the low energy diets without chlortetracycline did not yield quite as well. Chlortetracycline appeared to enhance carcass yield of hens with either low or high energy diets.

CARTER, R. D., R. N. RISNER, and H. YACOWITZ. (Ohio Agric. Expt. Sta., Wooster.)

SOME EFFECTS OF GROWTH HORMONE PREPARATIONS IN PULLETS AND MATURE HENS. *Poultry Sci. 34(6)*: 1407-1414. 1955.—The injection of 1 or 2 mg of a pituitary growth hormone preparation had little influence on the growth of mature hens and pullets. The injection did cause a marked decrease in egg production. In most birds, molting accompanied the decreased egg production. Broodiness was seen in pullets injected with a porcine growth hormone preparation containing a small quantity of ACTH. Results could not be duplicated with a combination of growth hormone and ACTH formulated to duplicate the original injection.—R. D. Carter. (Biological Abstracts)

CASTLE, M. E. and J. O. L. KING.

FODDER-BEET FOR FATTENING DUCKS. *Empire J. Exp. Agric.*, 1955, 23, 251-256. [Dept. Animal Husb., Fac. Vet. Sci., Univ. Liverpool.]—In each of 6 trials with ducks 3 weeks old, one group was fed on meal only, as much as the birds would clean up in 3 feeds a day. This meal contained 18.7 per cent. crude protein. Another group was given 126 g. of a meal with 25.6 per cent. crude protein, and minced fodder beet to appetite. The birds were weighed weekly and killed at 9 weeks of age. The birds receiving meal only were on the average 12 per cent. heavier at the end of the experiment, a result which was statistically significant. Dressing percentages were not significantly different. The birds getting fodder beet ate 44 per cent. less meal than those getting meal only, but their meal was more costly. It was calculated that 2.98 g. beet replaced 1 g. meal. Accurate costings of the trials were not made, but the possible economies of replacing some of the meal for fattening ducks by fodder beet are discussed.—T. D. Bell. (Nutrition Abstracts and Reviews)

CHOMYSZYN, M. Wplyw paszy na jakosc tluszczu u gesi.

THE INFLUENCE OF FEED ON THE QUALITY OF FAT IN GEESE. *Rocz.* Nauk rol. [*B*], 1954, 69, 91-104. Russian and English summaries.—Twenty-eight geese were given barley only for 12 days, then an addition of 40 ml. rapeseed oil daily for another 16 days and finally barley only for another 12 days. At the beginning of the rapeseed oil period, every 4 days during and at the end of the period, 4 geese were killed. When back on the exclusively barley ration 4 geese were killed after 8 days and 4 after 12 days. From all slaughtered birds samples of subcutaneous and internal (mesenteric and peritoneal) fat

were tested for iodine value, saponification value, refractive index and melting-point.

Both subcutaneous and internal fat assumed the qualities of rapeseed oil in all characteristics tested and in consistency and smell when rapeseed oil was given. The changes were distinct only after 8 days on the oil diet, and disappeared after 8 days when oil was not given. Subcutaneous fat was softer than internal, having higher I value and refractive index and lower melting-point, whether oil was given or not. (From summary.)—T. D. Bell. (Nutrition Abstracts and Reviews)

COOPER, D. M. and **R. F. GORDON** (Poultry Research Station, Houghton, England)

A STUDY OF A POSSIBLE MODE OF ACTION OF ANTIBIOTICS IN CHICKS. *Jour. Sci. Food and Agr.* 6:664-674, 1955.—During the past two years a total of 94 groups of chicks were used in an attempt to transmit a growth-depressing agent by means of (a) feeding small quantities of raw-gut contents in the mash and (b) transmission by indirect contact with 'infected' chicks. Eighty-seven and 89.1% respectively of the groups showed some response to the addition of the antibiotic to the diet but on statistical analysis only 37.0% of the groups during the first year and 54.3% during the second year showed responses which were significant statistically. In the first year, nine groups showed this depression following artificial 'infection' and eight groups apparently acquired a natural 'infection'. During the second year, fifteen groups showed a depression following feeding of gut contents and ten groups became 'infected' naturally by indirect contact. Evidence is presented that this depression in weight occurs between the first and second week of age, and if not apparent by this time, is unlikely to occur by the third week of age.

Experimental evidence is also presented to show that of crude filtrates prepared from liver, lung and intestinal contents of 'infected' chicks and inoculated into day-old chicks, only the crude lung filtrate produced a highly significant depression on the body weight of chicks at 18 days of age. This depression may be overcome by feeding procaine penicillin in the diet. Both intranasal and oral routes of inoculation were equally satisfactry in producing this depression. Certain technical difficulties in these investigations are discussed. (Authors)

DANNENBURG, W. N., B. L. REID, E. E. ROZACKY, and **J. R. COUCH.** (Texas A. and M. Coll. System, College Station.)

AN INORGANIC CHICK GROWTH RESPONSE. *Poultry Sci. 34(5):* 1023-1026. 1955. Results obtained on the addition of the ash of distillers dried solubles to a purified diet for chicks indicate the presence of a mineral constituent of the ash which will stimulate chick growth. The straight-run New Hampshire chicks used in these studies were obtained from dams which were raised on wire and fed a corn-soybean oil meal diet, deficient in unidentified growth factors. The chicks were fed a purified type diet made up of cerelose and isopropanol extracted soybean protein (Drackett Assay C-1) supplemented with all of the essential vitamins and minerals above the levels recommended by the National Research Council. The ash of distillers dried solubles which was prepared by the ignition in an open flame and then ashing at 600°C until a constant weight was obtained produced a growth response equal to approximately ½ of that obtained with untreated distillers dried solubles. The addition of A, P, F, As, S, Co, Pb or K to the basal diet was found ineffective in duplicating the response in growth obtained with the distillers dried solubles ash. Evidence is also presented to the effect that distillers dried solubles may exert an influence on the use of Ca by the chick.—*B. L. Reid.* (Biological Abstracts)

FROLICH, A.

EFFECTIVENESS OF DL-METHIONINE IN OVERCOMING THE DELETERIOUS EFFECTS OF INSUFFICIENTLY HEATED SOYBEAN OIL MEAL TO GROWING CHICKS. *Acta Agric. scand.*, 1954/55, 5, 3-10. [Nat. Animal Exp. Sta., Upsala.]—Two rations used for a chick feeding trial were each made up of soya bean oilmeal 16.6,

sunflower seed oilmeal 4, lucerne meal 4, minerals 4.1, oils rich in vitamins A and D, vitamin supplements rich in riboflavin, nicotinic acid and vitamin B_{12}, maizemeal 20.5, wheat bran 11 and grits (barley and oats) to 100; they differed in the type of soya bean meal used. Meal B had been fully heat-treated and showed no urease or antiproteolytic activity in laboratry tests; the other meal, C, had received less heating during manufacture and gave positive results in both tests.

Duplicate groups, each of 20 chicks, that had received meal B from hatching to 4 weeks of age had a mean weight gain of 200 g., those that had received meal C of 157 g. Corresponding groups that had received the rations containing either meal B or C supplemented with 0.15 per cent. DL-methionine had mean weight gains at 4 weeks of 206 and 197 g., respectively. At 8 weeks of age the chicks receiving meal C plus methionine were as heavy as those receiving meal B with or without the addition of methionine; those receiving meal C alone were significantly lighter. In a further trial in which the meals were compared as ingredients at a lower level (10 percent.) in a ration that also contained 6.3 per cent. fish-meal, the group receiving meal B was only 5 per cent. heavier, at 8 weeks of age, than the group that had received meal C.—K. J. Carpenter. (Nutrition Abstracts and Reviews)

GAWECKI. K., M. NEUMAN, and **T. PONIKIEWSKA,** Wplyw drozdzy naswietlanych na wylegowosc jaj kur roznych ras.

THE INFLUENCE OF IRRADIATED YEAST ON THE HATCHABILITY OF EGGS OF HENS OF DIFFERENT BREEDS. *Rocz. Nauk rol.* [*B*], 1954, 68, 475-488. Russian and English summaries.—Yeast comprised 5 per cent. of the mash of 104 Rhode Island Red and 268 Leghorn hens. In the ration of half of the hens half of the yeast was irradiated. In 3 months the birds receiving irradiated yeast hatched 3044 eggs, compared with 2906 for the controls. This represented an increase of 4 per cent. in the Rhode Island Reds and 9 per cent. in the Leghorns. No influence of irradiated yeast on fertility was observed. (From summary.)—T. D. Bell. (Nutrition Abstracts and Reviews)

GORDON, RICHARD S., and **IRWIN W. SIZER.** (Massachusetts Inst. Technol., Cambridge.)

ABILITY OF SODIUM SULFATE TO STIMULATE GROWTH OF THE CHICKEN. Science 122(3183): 1270. 1955. (Biological Abstracts)

GRIMINGER, P., H. FISHER and **H. M. SCOTT.** (Illionis Agric. Expt. Sta., Urbana.)

ON THE ARGININE REQUIREMENT OF THE GROWING CHICK. *Poultry Sci. 34(6)*: 1247-1249. 1955.—The substitution of dextrin for cerelose in a casein-type purified diet, or fresh mixing of the diet before feeding, did not obviate the high arginine requirement recently reported for young chicks fed purified diets (approximately 1.7% of the diet). It is believed that this high requirement is not due to destruction or nonavailability or arginine, but to a particularly high arginine requirement in the young chick accentuated by the need for this amino acid for muscle creatine synthesis; lower requirements might possibly be explained by presence of preformed creatine or suitable precursors in non-purified diets, and by use of older chicks.—P. Griminger. (Biological Abstracts)

HARMS, R. H., B. L. REID and **J. R. COUCH.** (Texas A. and M. Coll., College Station.)

STORAGE OF VITAMIN A IN CHICK LIVERS AS A CRITERION OF STABILITY, AVAILABILITY, AND DIETARY LEVEL. *Poultry Sci. 34(5)*: 1125-1133. 1955.—Fish oil and a stabilized vitamin A concentrate containing approximately the same amount of vitamin A on a per g basis were tested under practical conditions with regard to effect on chick growth and storage of the vitamin in the liver. Experiments of both 4-week and 10-week duration were used. The vitamin A content of livers from chicks fed stabilized vitamin A concentrates was significantly increased over that of those fed fish oil as the source of

the vitamin even though the same potencies were mixed in the feed at the same time on a per pound basis in both the 4-week and 10-week experiments. Average chick weights were also increased by feeding stabilized concentrate in contrast to fish oil as the source of the vitamin. Storage of feed at 55°F where fish oil was used as the source of the vitamin resulted in increased vitamin A content of liver over that when feed was stored at room temperature and when the experiment was initiated in the summer. Levels of vitamin A from 500 to 240,000 international units of the vitamin per pound of feed were fed to chicks during 4-week experimental periods. Increase in the vitamin A content of the liver tended toward a linear relationship as the vitamin A level was increased from the lowest to the highest level in these studies. Survival time and time required to produce a vitamin A deficiency in chicks after the first 4 weeks when fed a diet practically devoid of vitamin A or provitamin A was directly related to quantity of vitamin A stored in bird livers at the end of the 4-week experimental feeding period. The percent of vitamin A ingested and stored in the liver ranged from 7.1 to 43.0 and tended to increase as the vitamin level was increased. A 4-week chick test can be used for determining stability, availability and utilization of vitamin A from different products in mixed feeds and the storage of the vitamin in the liver can be used to evaluate such products. —B. L. Reid. (Biological Abstracts)

HARVEY, J. D., D. B. PARRISH, and P. E. SANFORD. (Kansas State Coll., Manhattan.)
THE APPLICATION OF DEUTECTOMY FOR REDUCING INITIAL VITAMIN A RESERVES IN NEWLY HATCHED CHICKS, AND SOME OBSERVATIONS ON THE APPARENT CONSUMPTION OF THESE RESERVES. *Poultry Sci. 34(6):* 1314-1321. 1955.—Deutectomy markedly reduced initial vitamin A reserves of newly hatched chicks, but the effect was smaller in chicks having inifially low reserves. Variances of survival times of chicks fed vitamin A-deficient feed indicated that reserves of deutectomized chicks were more uniform than those of unoperated birds. A lag in growth of deutectomized chicks during the first 2 weeks did not occur in chicks having initially low vitamin A reserves, so that probably vitamin A restriction is not responsible for the lag. Vitamin A in the residual yolk at hatching was largely absorbed during the 1st week. In spite of this and of adequate dietary supplementation (1000 or 2000 IU/lb.), liver vitamin A was depleted during the first 2 weeks. Depletion was more pronounced in deutectomized than in unoperated chicks. Liver vitamin A storage began at about 2 weeks of age when 1000 or 2000 IU/lb. of feed was given, and was not impaired by deutectomy.—*J. D. Harvey.* (Biological Abstracts)

HARVEY, J. D., D. B. PARRISH, P. E. SANFORD, and J. S. HUGHES. (Kansas State Coll., Manhattan.)
THE UTILIZATION OF CAROTENE AND VITAMIN A BY CHICKS DURING THE FIRST WEEKS AFTER HATCHING. *Poultry Sci. 34(6):* 1348-1357. 1955.—Apparent digestibilities of aqueous, oily and alfalfa-carotene by newly hatched chicks were between 65 and 100%. Aqueous or oily drenches of carotene or vitamin A or alfalfa meal fed to chicks during periods terminated between 12 and 62 hours after hatching led to increased liver vitamin A at 4 days and prolonged survival times on vitamin A-deficient diets. Injection of vitamin A or carotene emulsions into residual yolks at hatching led to increased liver vitamin A contents and prolonged survival times, the circumstances suggesting conversion of carotene to vitamin A at sites other than the intestinal wall. Chicks converted carotene to vitamin A at least as early as the first day after hatching, and vitamin A was used to support physiologic functions at least as early as the fifth day, and probably earlier.—*J. D. Harvey.* (Biological Abstracts)

HELDER, J. F., H. M. K. FRINGS, and P. UBBELS. Zetmeelhoudend weipoeder in opfokvoeder voor kuikens.
STARCHY DRIED WHEY IN A CHICK STARTING MASH. *Rijksinst. Pluimveeteelt, Beekbergen, Med.* No. 55, pp. 8. English sum-

mary.—To make use of whey from which lactose has been removed, an equal weight of barleymeal is added and the mixture is dried on rollers and ground. To equalise protein intake when it is compared with dried whey, 0.6 per cent. herring-meal is added to the ordinary whey.

The test was made with 18 groups of 20 North Holland Blue chicks in batteries on mesh floors. The starting mash was of meals, buckwheat, barley, yellow maize, oats, wheat, sesame and sunflower seed, herringmeal, dried whey of the different sorts, brewer's yeast, vitamins A and D_3, minerals and iodised salt. Mean weights at 10 weeks were for cocks on ordinary whey, 1291 ± 13.5 g., on starch-whey 1306 ± 13.5 g. and for hens 1173 ± 13.9 and 1193 ± 14.3 g.—*I. Leitch.* (Nutrition Abstracts and Reviews)

HERRICK, RAYMOND B., and JOHN L. ADAMS. (U. Wisconsin, Madison, Wisconsin.)

EFFECT OF EXOGENOUS GONADAL HORMONES ON SINGLE COMB WHITE LEGHORN PULLETS. *Poultry Sci 34(6):* 1362-1367. 1955—Four groups of 15 Single White Leghorn pullets were injected twice weekly with varying dosages of synthetic gonadal hormones. The groups and dosages follow: Control - propylene glycol (no hormone), diethylstilbestrol 4-16 mg/week, testosterone propionate 5-0 mg/week, progesterone 10-40 mg/week. Egg production was severely depressed by all hormones used. Feed consumption was believed affected only by differences in rate of egg production. No treatment effects were apparent on body weight. Egg weight, yolk weight, albumen quality, blood spots, hatchability and shell thickness were not affected significantly. Meat spots were significantly reduced by all hormone treatments. Progesterone depressed fertility significantly. It was noted that birds in which production was inhibited by progesterone molted heavily. Progesterone treated pullets recovered promptly after cessation of treatment. Next in order of recovery was the group given testosterone, followed by diethylstilbestrol treated pullets.—*Auth. summ.* (Biological Abstracts)

HEUSER, G. F. (Cornell U., Ithaca, N. Y.)

FEEDING HIGH LEVELS OF ANTIBIOTICS TO CHICKENS. *Poultry Sci. 35(1):* 81-84. 1956.—Duplicate pens of 181 White Rock pullet chicks were reared indoors to 12 weeks of age. Under conditions involving an outbreak of a respiratory disease a low level of antibiotic (10 g of chlortetracycline/ton of feed) increased market weight only slightly, had no effect on feed efficiency and decreased mortality slightly. High levels of antibiotics (50 or 100 g of chlortetracycline or 100 g of oxytetracycline/ton of feed) increased weight, improved feed efifciency and decreased mortality. Time requird to bring birds to marketable size was also decreased.—*G. F. Heuser.* (Biological Abstract)

HEYWANG, BURT W. (U. S. Department Agric., Glendale, Arizona), and **A. R. KEMMERER.** (U. Arizona, Tucson.)

THE EFFECT OF PROCAINE PENICILLIN AND ASCORBIC ACID ON EGG WEIGHT AND SHELL THICKNESS DURING HOT WEATHER. *Poultry Sci. 34(5):* 1032-1036. 1955.—During hot weather (maximum temperature 101°-104°F) neither 30 ppm procaine penicillin nor 0.01% ascorbic acid in diets of laying White Leghorn hens increased egg weight or egg shell thickness.—*B. W. Heywang.* (Biological Abstracts)

HEYWANG, BURT W. and H. R. BIRD. (U. S. Dept. Agric., Glendale, Arizona.)

RELATIONSHIP BETWEEN THE WEIGHT OF CHICKS AND LEVELS OF DIETARY FREE GOSSYPOL SUPPLIED BY DIFFERENT COTTONSEED PRODUCTS. *Poultry Sci. 34(6):* 1239-1247. 1955.—In a series of experiments, day-old New Hampshire and White Leghorn chicks were fed, for 35 or 42 days, diets containing ground raw cottonseed, or screw-press, hydraulic, solvent-extracted, or prepress solvent-extracted cottonseed meals, or pure gossypol. Dietary levels of free gossypol furnished by those sources varied from about 0.008 to

0.075% in different experiments. Mortality was low in each experiment. Data obtained on growth, diet consumption, and efficiency of diet utilization indicate that the free gossypol content of diets should not be greater than 0.016% when fed to White Leghorn chicks or greater than 0.020% when fed to New Hampshire chicks.—*B. W. Heywang.* (Biological Abstracts)

HILL, C. H. (N. Calonina State Coll., Raleigh), and **J. W. KELLY.** THE EFFECT OF FISH MEAL AND ANTIBIOTICS ON THE GROWTH OF CHICKS FED EQUAL AMOUNTS OF FEED. *Poultry Sci. 34(5):* 1030-1032. 1955.—High levels of antibiotics plus 5% fish meal significantly increased the 4-week weight of chicks over the basal lots or those supplemented with fish meal or antibiotics alone when the feed intake of all lots was equalized.—*Auth. summ.* (Biological Abstracts)

HILL, F. W. (Cornell U., Ithaca, N. Y.) STUDIES OF THE ENERGY REQUIREMENTS OF CHICKENS. 4. EVIDENCE FOR A LINEAR RELATIONSHIP BETWEEN DIETARY PRODUCTIVE ENERGY LEVEL AND THE EFFICIENCY OF EGG PRODUCTION. *Poultry Sci. 35(1):* 59-63. 1956.—Relative eficiency of rations for layers was determined by comparing observed feed consumption with that predicted by the Byerly partition equation for the observed production, body weight and weight changes. Relative efficiency was calculated by the expression 100 x predicted feed consumption ÷ observed consumption. Applying the calculation to performance data on hens fed rations containing 740-945 calories of productive energy per pound (calculated) showed a linear relation of relative efficiency to dietary energy concentration. The regression calculated from the data was $E = 11.3 + .096X$ where E represents relative efficiency and X productive energy level in calories per lb. The linear regression was followed by rations higher in energy level, formulated by use of feed grade tallow, provided that a value of 2900 calories per pound was used for tallow. The consistency of this value for tallow in relation to other productive energy values was discussed.—*F. W. Hill.* (Biological Abstracts)

HOHLS, HANS-WILHELM. (Bundesforschungsanstalt für Kleintierzucht, Celle, Germany.) THE RATE OF DAILY FEED CONSUMPTION, THE DAILY MAXIMUM PROTEIN ANABOLISM AND THEIR IMPORTANCE IN THE EVALUATION OF FEEDING EXPERIMENTS WITH ANTIBIOTIC SUPPLEMENTS. *Poultry Sci. 34(3):* 714-724. 1955.—The stimulating growth effect of antibiotics is due to 2 factors. (1) The feed intake in relation to the basal metabolism is increased in the first weeks and this causes a better ratio of production feed and maintenance feed and therefore a better feed efficiency. (2) The amount of protein retained is increased. Often the maximal daily protein anabolism is exceeded by the control group, in which case supplements of antibiotics cannot increase the amount of the protein retained and therefore have little effect on growth stimulation. To calculate the amount of protein retained it is necessary to measure the amount of fat stored. A method is described for doing this by measuring the gaseous metabolism without sacrificing the animal.—*H. W. Hohls.* (Biological Abstracts)

HOHLS, H. W. Kükenaufzuchtversuche mit Penicillium-Mycel. CHICK REARING EXPERIMENTS WITH PENICILLIN MYCELIUM. *Arch. Geflügelk.*, 1955, *19*, 425-432. [Bundesforschungsanst. Kleintierzucht, Celle.] English summary.—Four groups of 19 White Leghorn chicks were reared to 8 weeks in dark batteries on a ration of wheat, oat kernels, hulled barley and maize 14 each, lucerne meal 4, wheat germ 2, minerals 3, meatmeal 8.6, soya grits 10.2 and wheatfeed 16.2 per cent., with 500 mg. Dohyfral D 80 per 100 kg. ration, or the same with 4.5, 13.6 or 22.8 per cent. penicillin mycelium (corresponding to 1, 3 or 5 per cent. mycelium protein) replacing some or all

of the meatmeal, and compensatory adjustments in the amounts of soya grits and wheatfeed were made.

Final weights were slightly greater with 3 per cent. mycelium protein and slightly less with 5 per cent., probably because the digestibility of the protein of this ration was less than that of the others. From measurements of the respiratory quotient twice weekly (see Abst. 4702, Vol. 24) the biological values of the 4 different protein mixtures were calculated weekly. They differed little and declined in much the same way with the age of the chicks, except for an unexplained rise in the sixth week, possibly due to a change of temperature. The results are discussed in conjunction with those of Wetterau (*Kühn-Archiv*, 1954, *68*, 202), from which they differ. The present experiments do not establish the most economic proportion of penicillin mycelium for the rearing of chicks.—*W. M. Deans.* (Nutrition Abstracts and Reviews)

HOHLS, H. W. Der Anteil tierischen Eiweisses im Kükenaufzchtfutter und sein Ersatz durch pflanzliches Eiweiss bei Zugabe von antibiotischen Mitteln.

THE ROLE OF ANIMAL PROTEIN IN CHICK REARING RATIONS AND ITS REPLACEMENT BY PLANT PROTEIN WITH ANTIBIOTICS. *Ztschr. Tierernährung Futtermittelk.*, 1955, 10, 238-249. [Bundesforschungsanst. Kleintierzucht, Celle.]—Studies were made on 84 groups of 19 or 20 growing and fattening chickens. The rations contained 16 to 17 per cent. total protein in the first 4 weeks of life, but often this was later reduced. Supplements of penicillin or more rarely aureomycin or terramycin were given in some experiments, and sometimes vitamin B_{12}.

It was concluded that not more than 5 per cent. of animal protein is necessary for adequate feed utilisation, and that when antibiotics are given the animal protein can be reduced to 2 per cent.—*D. Duncan.* (Nutrition Abstracts and Reviews)

HOIE, J. and **O. SANDVIK.** Forsok med ulike mengder koksalt i fôret til kyllinger og høner.

EXPERIMENTS WITH DIFFERENT LEVELS OF COMMON SALT IN THE RATIONS OF CHICKS AND LAYING HENS. *Meld. Norges Landbrukshogsk.*, 1954, *34*, 501-524. [Inst. Poultry Fur Animals, Agric. Coll. Norway, Vollebekk.] English summary.—In 1951 a group of white Italian chicks grew slowly, were small at 2 weeks and later unthrifty. They had digestive disturbances and many died. Feathering was slow and the development of secondary sex characters late, so that the sexes could not be distinguished at 4 weeks. Addition of NaCl to the ration, which contained only 0.18 per cent., gave an immediate response.

After this, 7 experiments were made with day-old chicks and 1 with 6-week-old cocks. The chicks had a normal starter meal except that it contained only 0.2 per cent. NaCl, as computed from Na and Cl. Weight increase improved with added salt up to 0.59 and 0.94 per cent. but there may have been retention of water at these levels. The basal diet, containing 0.2 per cent. NaCl, produced pica. In another trial, 4 per cent. salt caused thirst and produced soft droppings but no other evidence of damage. In a third trial 6.2 per cent. salt gave high mortality and oedematous carcasses, in a fourth, 2.5 per cent. salt gave better weight gain than 0.5 per cent. but 5.5 and 8.5 per cent. were too high.

In 6-week-old chicks given 6.3 per cent. salt appetite was below normal but there was no sign of damage with 4.3 per cent.

Two further trials showed that deficiency of NaCl is deficiency of Na, not of Cl nor of both, and that the higher percentages of NaCl do reduce the dry matter of carcasses. The final trial was with 6 groups each of 2 laying hens. Salt in feed varied from 0.5 to 6.5 per cent. Most eggs were laid at 3.5 per cent. At all levels above 0.5 per cent. droppings were soft and water consumption was high.—*I. Leitch.* (Nutrition Abstracts and Reviews)

HOPPER, JOHN M., H. M. SCOTT and B. CONNOR JOHNSON. (U. Illinois. Urbana.)
THE GROWTH PROMOTING ABILITY OF FLUID EGG YOLK. *Poultry Sci. 35(1):* 195-197. 1956—The addition of fluid egg yolk to a purified diet stimulated chick growth. As a result of having fed egg yolk in combination with liver powder, dried whey and fish solubles it is concluded that egg yolk owes its major growth promoting ability to the "fish factor" contained therein.—*H. M. Scott.* (Biological Abstracts)

ISSAWI, H. F., S. S. KHISHIN, and S. HAFEZ. (Ein Shams U., Cairo, Egypt.)
RESPONSE OF GROWTH AND DRESSING OUT PERCENTAGE IN IMPORTED BREEDS OF COCKERELS TO STILBESTROL IMPLANTATION IN THE SUBTROPICS. *Poultry Sci. 35(1):* 85-92. 1956.—Cockerels (130) of 4 imported breeds (Blue Holland (BH), Rhode Island Red (RIR), L. Sussex and W. Leghorn) and indigenous breeds, were used in a study to determine effect of stilbestrol implants (15 mg each) on gains and carcass characteristics. Thirteen weeks after implantation a carcass study was made. The response varied with breed, age at implantation, and stage of implantation. Effect of season and body weight at sexual maturity may be involved. The treatment effect was more pronounced in RIR and BH than in other breeds studied, and more pronounced in 20 weeks than in 25 weeks of age, possibly due to genetic differences in endocrine system. The average per cent of edible portion increased in all imported breeds, this was most pronounced when implanted at 25 weeks of age. Effect of implantation on giblets weight was inconsistent in different breeds. Implantation may have a differential effect on various major tissues.—*S. Hafez.* (Biological Abstracts)

JOHNSON, ELTON L. (Iowa State Coll., Ames)
TURKEYS REQUIRE VITAMIN B_{12} AND CHOLINE. *Poultry Sci. 34(5):* 1013-1016. 1955.—Experiments with over 1200 Beltsville Small White poults have shown that turkeys require both vitamin B_{12} and choline in the diet for maximum livability and growth. The addition of choline to the ration improved poult livability even though perosis was not present to any appreciable extent among turkeys in these experiments. Date of hatch exerted a highly significant effect on the poult's response to dietary variables. Part of this response could be explained on the basis of vitamin B_{12} depletion among the dams. However, depletion of unidentified factors among the dams associated with feeding a ration containing only protein of vegetable origin may also be a possibility. The vitamn B_{12} requrement of the Beltsville Small White poult under the conditions of these experiments was not more than 3 μg/kg of diet.—*E. L. Johnson.* (Biological Abstracts)

JUKES, H. G., D. C. HILL, and H. D. BRANION. (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF ANTIBIOTIC ON THE RATE OF PASSAGE OF FEED MARKER THROUGH THE DIGESTIVE TRACT OF THE CHICK. *Poultry Sci. 35(1):* 232-234. 1956.—The addition of 10 ppm procaine penicillin G or Aureomycin HCl to the diet increased the rate of passage of carmine or chromic oxide through the digestive tract of 3 to 4 week-old chicks. The effect was reversible and appeared within 17-71 hours from the time the antibiotic was fed.—*D. C. Hill.* (Biolgical Abstracts)

KEELING, A. D., C. H. HILL, H. W. GARREN, and J. W. KELLY. (North Carolina State Coll. Raleigh.)
THE EFFECT OF CHLORTETRACYCLINE AND FISH MEAL ON THE GROWTH AND THYROIDS OF CHICKENS. *Poultry Sci. 34(6):* 1453-1454. 1955.—Chicks were fed a corn-soybean meal type diet or one containing 5% fish meal. Both diets were fed with and without adding 100 mg of chlortetracycline HCL per lb. Addition of the antibiotic had no effect on the weight or histological appearance of the thyroid gland although a significant increase in body weight re-

sulted. Results clearly show that the growth response to chlortetracycline is not necessarily dependent upon a change in the thyroid gland. —From auth. summ. (Biological Abstracts)

KLINE, IRENE T. (Western Res. U., Cleveland, Ohio.)
RELATIONSHIP OF VITAMIN B_{12} TO STILBESTROL STIMULATION OF THE CHICK OVIDUCT. *Endocrinology 57(1):* 120-128. 1955.—In vitamin B_{12} deficient pullets, maintained on a diet deficient in vitamin B_{12} and low in choline and methionine, oviduct response to stilbestrol was significantly lower than in controls resupplemented with vitamin B_{12}. It is therefore concluded that vitamin B_{12} is essential to optimal response of the chick oviduct to stilbesrol. Supplements of vitamin B_{12} were unable to increase effectiveness of pteroylglutamic acid (PGA) in overcoming aminopterin inhibition of stilbestrol action in vitamin B_{12}-deficient pullets receiving just enough PGA to overcome the aminopterin given. Results are consistent with the idea that vitamin B_{12} is related to the action of PGA rather than as a catalyst which promotes the conversion of PGA to metabolically active forms.—*Author.* (Biological Abstracts)

KRUGER, L., E. LOTHE, and **G. SEEFELDT.** Aufzucht-Versuch mit gepresstem Küken- und Junghennen-Alleinfutter.
REARING EXPERIMENTS WITH PRESSED ALL-MASH FOR CHICKS AND PULLETS. *Arch. Geflügelzucht Kleintierkunde,* 1955. *4,* 190-192.. [Inst. Tierzucht, Justus Liebig Hochsch., Giessen.]—Of 4 groups of 40 day-old chickens, 2 groups were Leghorn × Rhode Island and 2 groups the reciprocal cross. One group of each cross had a standard ration with green feed, carrots and cod liver oil, the other had the pressed mash ration and carrots.

There was little difference in growth at first, but after 20 weeks the Leghorn × Rhode Island group given the pressed mash were 11 per cent. heavier than those on standard feed; in the other 2 groups the difference was only 1 per cent. In both crosses utilisation of the pressed mash was poorer in the first 8 weeks, but later it was better than that of the standard ration. Over the whole 20 weeks the pressed mash was 5 per cent. better in this respect.

The composition of all rations is tabulated in full.—*D. Duncan.* (Nutrition Abstracts and Reviews)

KUMANOV, S. and **P.VOLCHEV.** Prouchvaniya vorhu vliyanieto na slonchogledoviya, leneniya, ricinoviya i ot grozdovi semki shrotove vorhu noslivostta na kokoshkite.
INFLUENCE OF SUNFLOWER, LINSEED, CASTOR SEED and GRAPESEED MEALS ON THE EGG PRODUCTION OF HENS. *Nauch. Trudove, Selskostop, Akad. "Georgi Dimitrov," Sofia,* 1953-54, *475,* 41-50. Russian summary.—Four groups of 20 Rhode Island hens in their second year received for 6 months rations differing only in containing sunflower, linseed, grapeseed or castorseed meal at the 20 per cent. level The last group had to be excluded because egg yields fell rapidly for 6 weeks. For the other 3 groups the digestible protein in the ration ranged from 10.83 per cent. with grapeseed to 14.0 per cent. with sunflower seed meal.

The mean egg yields in 6 months were with sunflower meal 113.18, linseed meal 106.82 and grapeseed meal 108.74. The mean intake of fodder units per bird was 27.7, 28.0 and 28.4. Fertility of the eggs and viability were good. There was no difference in liveweight of the hens at the end of the experiment.

It was concluded that all the meals except castorseed can be used at the 20 per cent. level in rations for laying hens. The relatively low protein and high fibre content of the grapeseed meal should be considered when rations are made up. (From summary.)—*D. Duncan.* (Nutrition Abstracts and Reviews)

LAUGHLAND D. H. (Chem. Div. Sci. Serv., Canada Dept. Agric., Ottawa). and **W. E. J. PHILLIPS.**
THE UTILIZATION OF VITAMIN A BY NORMAL AND

DEUTECTOMIZED CHICKS. *Poultry Sci. 34(6):* 1359-1362. 1955.—The ability of chicks to utilize vitamin A acetate and β-carotene for growth and liver storage of the vitamin was studied in 2 experiments. In experiment 1, normal chicks were used and in experiment 2, chicks which were deutectomized at 1 day of age were used. The amount of vitamin A stored in the liver of the supplemented groups at 8 days of age was significantly greater than controls in both normal and deutectomized chicks. In the case of the β-carotene supplemented groups this effect became apparent at 15 days of age. At 4 weeks of age liver weight of birds receiving either vitamin A or β-carotene was significantly greater than controls. Results demonstrate that the chick is able to utilize vitamin A and β-carotene for metabolic purposes from an early age.—*D. H. Laughland.* (Biological Abstracts)

LENKEIT, W. and **E. STAHN-TAUPITZ.** Zu dem Einfluss stiegender Kaliumgaben, nach Versuchen an Hühnern.

EFFECT OF INCREASING AMOUNTS OF POTASSIUM IN FEED, IN EXPERIMENTS WITH POULTRY. *Arch. Tierernährung,* 1954, No. 5, Beihefte, 197-209. [Inst. Tierphysiol., Univ. Göttingen.]—The subjects were 4 hens initially 6 months old, weighing 1481 to 1781 g. and at the beginning of the laying period. The basal ration consisted, in g. per hen daily, of wheatmeal 66, fishmeal 4, yeast 5, casein 3, cellulose 2 and calcium phosphate 4; it supplied 0.27 to 0.31 g. K daily, and 0.145 g. Na. Distilled water was supplied and was used also for mixing the diet. Extra K was given as chemically pure $KHCO_3$ in aqueous solution twice daily by stomach tube. In successive periods of about a month the total daily intake in g. was 0.31, 1.29, 1.84, 1.94, 2.65, 3.43 and 4.99, or from 190 to 4340 mg. per. kg. bodyweight.

With intakes up to 2.65 g. (60 m. equiv.) of K daily, appetite and egg production were not impaired, but with higher amounts both were adversely affected. When the dose was increased above 5 g. the hens died in 36 hr. One hen given 2.65 g. without a gradual increase in intake died within 36 hr. The volume of excreta increased progressively, but although there was an initial increase in dry matter excretion normal levels were regained after about the first month. K excretion rose with K intake and the K content of the eggs was not affected. Blood K was affected only by the highest dose of K. Up to 1.84 g. K did not affect Na excretion, but in one hen it was increased by higher doses. Na depletion was not demonstrable, nor any affect on N, Ca and P metabolism.—*D. Duncan.* (Nutrition Abstracts and Reviews)

LEWIS R. W., D. J. BRAY, and **P. E. SANFORD.** (Kansas State Coll., Manhattan.)

CHICKS PREFER FAT-SUPPLEMENTED DIETS. *Poultry Sci. 34(5):* 1165-1167. 1955.—Heavy crossbred chicks (1-8 weeks of age) were permitted to consume free-choice (1) nonfat-supplemented basal diet; (2) basal + 2% corn oil; (3) basal + 2% lard; (3) combination of basal + (2) and basal + (3); (4) combinations of (2) and (3). Supplementation with 2% lard exceeded basal feed consumption 6.8%; whereas, supplementation with 2% corn oil excelled basal feed consumption 20%. Results, using palatability preference as evaluated by feed consumption, indicate that chicks prefer diets supplemented with 2% fat. —*P. E. Sanford.* (Biological Abstracts

LIBBY, DAVID A., JOSEPH MEITES, and **PHILIP J. SCHAIBLE.** (Michigan State, U. East Lansing.)

GROWTH HORMONE EFFECTS IN CHICKENS. *Poultry Sci. 34(6):* 1329-1331. 1955.—Experiments (3) were conducted to determine the growth value of growth hormone (somatotropin). Daily injections of 1-2 mg/chick in the 4-8 week period did not affect body weight or feed efficiency in White Leghorn cockerels, but significantly decreased the growth rate in White Leghorn chicks in the 1-3 week period. A single injection of 50 mg at 14 days incubation had no effect on body weight or blood sugar of newly hatched chicks. No differences were noted in total protein, fat or water in the flesh of the thigh of 8-week-old chicks,

nor in the comb size. In 3-week-old chicks, comb, liver, or spleen weights were not affected. The mammalian growth hormone exerts little or no effect on growth of chickens.—*Auth. summ.* (Biological Abstracts)

LIBBY, DAVID A., and **PHILIP J. SCHAIBLE.** (Michigan State, East Lansing.)
THE EFFECT OF LOW-LEVELS OF FURAZOLIDONE IN POULTRY FEEDS UPON EARLY GROWTH OF CHICKENS. *Michigan State Univ. Agric. Expt. Sta. Quart Bull. 38(2):* 241-251. 1955.—Six experiments were conducted to study effectiveness of low levels of furazolidone in feeds in stimulating early growth of chicks. Growth rate and feed efficiency were slghtly improved by addition of approximately 7.5 of furazolidone per ton of feed with no adverse effect on livability. Growth responses were obtained in most instances in the presence of penicillin and arsanilic acid. Influence of different supplemental sources of carbohydrates and milk products upon the value of furazolidone was investigated. In general, whey products enhanced the value of the substance.—*Authors.* (Biological Abstracts)

LINDBLAD, G. S., W. G. HUNSAKER, and **J. R. AITKEN.** (Canada Dept. Agric. Ottawa.)
THE INFLUENCE OF PENICILLIN AUREOMYCIN AND 3-NITRO-4-HYDROXYPHENYLARSONIC ACID ON THE GROWTH OF GOSLINGS. *Poultry Sci. 34(6):* 1259-1261. 1955.—Two experiments were conducted to test the effect of antibiotics on growth rate including penicillin. Aureomycin and 3-nitro-4-hydroxypenylarsonic acid in the diet of Pilgrim goslings. There were 16 males and 14 females per treatment in the 1st test, and 14 males per treatment in the 2nd. None of the compounds tested improved body weights after 3 weeks of age. However, in 1 test penicillin and Aureomycin caused a transitory increase in body weight at 2 weeks of age, which subsequently disappeared. The arsonic acid (50 ppm) depressed growth in the females but not in the males.—*Auth. summ.* (Biological Abstracts)

MARCH, B. E., J. BIELY, and **S. P. TOUCHBURN.** (U. British Columbia, Vancouver, Canada.
THE COMPOSITION OF THE BREEDER DIET AND BLOOD CLOTTING IN DAMS AND CHICKS. *Poultry Sci. 34(5):* 1097-1100. 1955.—Chicks were hatched from dams fed different levels of dehydrated cereal grass and dehydrated alfalfa. The prothrombin times of blood from the dams were similar whether or not the ration fed contained dehydrated green feed. The amount of vitamin K supplied to the dams from dehydrated green feed was reflected in the prothrombin times of the blood from the newly-hatched offspring. A level of 2.5% of dehydrated green feed in a breeder ration composed of natural ingredients was found to permit only marginal carryover of vitamin K.—*J. Biely.* (Biological Abstracts)

MATTERSON, L. D., R. H. BUNNELL, LOIS DECKER STINSON, E. P. SINGSEN, and **L. M. POTTER.** (U. Connecticut, Storrs.)
THE EFFECT OF INCORPORATING DIPHENYL-P-PHENYLENEDIAMINE (DPPD) INTO A RATION CONTAINING VARIOUS LEVELS OF VITAMIN A FROM FISH OILS. *Poultry Sci. 34(5):* 1080-1084. 1955.—Growth and blood and liver levels of vitamin A were used in criteria of measurement in a study to determine whether incorporating an antioxidant into a feed would improve utilization of vitamin A from fish oils. Chicks, non-A-depleted, were distributed in lots of 28 birds each and fed graded levels of vitamin A for a period of 8 weeks. At 2, 4, and 8 weeks, 5 birds were sacrificed from each lot for blood and liver analysis. From this study it was found that maximum growth response was obtained with 33% less vitamin A in the ration in the presence of DPPD than in its absence. At the levels of vitamin A intake studied, the vitamin A/g of liver at 8 weeks of age was 2-5 times as great when DPPD was included in the ration. Plasma levels of vitamin A were increased when DPPD was included in the ration, but the magnitude of this response, in the plasma,

was not as great as in the liver storage of vitamin A. From the data presented it is postulated that DPPD is acting in vivo as a biological antioxidant.—*L. D. Matterson.* (Biological Abstracts)

MAYFITLD, H. L., R. R. ROEHM, and **A. F. BEECKLER.** (Montana Agric. Expt. Sta., Bozeman.)
RIBOFLAVIN AND THIAMINE CONTENT OF EGGS FROM NEW HAMPSHIRE AND WHITE LEGHORN HENS FED DIETS CONTAINING CONDENSED FISH OR DRIED WHALE SOLUBLES. *Poultry Sci. 34 (5):* 1106-1111. 1955.—Riboflavin and thiamine determinations were made on eggs from New Hampshire and single comb White Leghorn hens fed 3 different mashes, each supplemented with wheat and oats to constitute the total ration. Mash 1, considered the control, contained 10% meat scraps and 15% soybean oil meal; mash 2, 3% condensed fish solubles, 15% soybean oil meal, 6% meat scraps and 1% steamed bone meal; mash 3, 1% dried whale solubles, 17% soybean oil meal, 6% meat scraps and 1% steamed bone meal. Feeding the various rations to the 2 breeds of chickens did not affect riboflavin content of the egg. However, White Leghorn hens laid eggs that were significantly higher in riboflavin, 4.24 μg. than did the New Hampshire hens, 3.58 μg/g of whole egg. Eggs from the New Hampshire hens fed the various rations were similar in thiamine, 0.99 μg/g of whole egg. However, eggs from the White Leghorn hens, fed rations containing condensed fish solubles or dried whale solubles were significantly higher in thiamine than were those from hens receiving the control ration, 1-17, 1.12, and 1.00 μg/g of egg respectively. Eggs from White Leghorn hens were significantly higher in thiamine than were those from New Hampshire hens. Since vitamin analyses of feeds consumed were very smilar, these data indicate that White Leghorn hens utilized more fully than did the New Hampshire hens some components, other than thiamine, in the rations containing condensed fish solubles or dried whale solubles, that influenced and increased the thiamine value of the egg.—*H. L. Mayfield.* (Biological Abstracts)

McCLAREY, CECIL F. (Western Washington Expt. Sta., Puyallup.)
THE RESTRICTION OF OOPORPHYRIN DEPOSITION ON EGG SHELLS BY DRUG FEEDING. *Poultry Sci. 34(5):* 1164-1165. 1955—Nicarbazin (Merck) or 4,4' dinitrocarbanilide, 2 hydroxy-4, 6-dimethylpyrimidine when fed for 3 days at .0125% of the ration completely inhibited the deposition of brown pigment on shells of eggs laid by White Plymouth Rock hens. Three days after initiation of drug feeding all eggs exhibited white shells. Normal brown shell eggs were laid upon the 3rd day after removal of nicarbazin from the diet. Nicarbazin may be used as an aid in a study of the biochemistry of action of genes responsible for white or brown eggshell color.—*C. F. McClary.* (Biological Abstracts)

McCLYMONT, G. L. and **D. C. DUNCAN.** 1952
STUDIES ON NUTRITION OF POULTRY. 3. TOXICITY OF GRAIN SORGHUMS FOR CHICKENS. *The Australian Vet. Jour. 28:* 229-233. (Vet. Res. Sta. Glenfield and Poultry Exp. Sta., Seven Hills).—Grain sorghum, when constituting 28 to 63 per cent of rations for chickens, has been found to depress growth by up to 50 per cent with the higher levels and to tend to increase the mortality rate. This depression in growth could continue up to 26 weeks of age. It is concluded that a toxic factor is responsible.

McCLYMONT, G. L. and **D. C. DUNCAN.** 1955
STUDIES ON NUTRITION OF POULTRY. 5. COMPARATIVE VALUE OF SYNTHETIC RIBOFLAVIN AND NATURAL VITAMIN B COMPLEX RICH FEEDS FOR SUPPLEMENTING WHEAT-MEATMEAL RATIONS FOR HATCHABILITY. *The Australian Vet. Jour., Apr. 1955, p. 91.* (Vet. Res. Sta., Glenfield and Poultry Exp. Sta., Seven Hills.)—The value of natural vitamin B complex rich feeds, and pantothenic acid, as supplements to wheat-meatmeal-synthetic riboflavin ration for breeding White Leghorn hens has been studied.

Supplements of lucerne meal, liver meal, whey powder, buttermilk powder, bran and pollard and pantothenic acid gave no appreciable or significant increase in hatchability above that obtained from the basal diet.

It is concluded that no B complex vitamin supplement was necessary for maximum hatchability with the basal diet used.

McCLYMONT, G. L. and L. HART. 1947

STUDIES ON NUTRITION OF POULTRY. 1. INVESTIGATIONS ON THE INADEQUACY OF HIGH WHEAT CONTENT RATIONS FOR HATCHABILITY IN WHITE LEGHORN PULLETS. —*The Australian Vet. Jour. Sept. 1947.* (Vet. Res. Sta., Glenfield)—Breeding rations containing over 90 per cent of wheat and wheatmeal, supplemented with different combinations of oil meals, meatmeal and green feed have been investigated as regards their nutritional adequacy for hatchability when fed to White Leghorn pullets.

1. Riboflavin deficiency appeared to be the major limiting factor in such rations. 2. Manganese deficiency did not appear to be a limiting factor on such rations. 3. The requirements of "animal protein" supplement on high-wheat rations, supplemented with oil meals, green feed and riboflavin, appeared to be no more than 1.5 per cent of the total ration. 4. The results suggested that some other factor or factors, essential for maximum hatchability on such rations, is supplied in adequate amounts by a combination of oil meals such as peanut, linseed and coconut meal, and green feed. Meatmeal appears to be deficient in this factor. 5. The concurrence of clubbed down, chondrodystrophy and parrot beak in dead embryos appeared to be associated with riboflavin deficiency. The occurrence of edema in dead embryos did not appear to be associated with riboflavin deficiency.

McCLYMONT, G. L. and L. HART. 1948

STUDIES ON NUTRITION OF POULTRY. 2. INVESTIGATIONS ON THE EFFECT OF VITAMIN A DEFICIENCY ON HATCHABILITY AND EGG PRODUCTION. *The Australian Vet. Jour. Jan. 1948.* (Vet. Res. Sta., Glenfield).—1. The effect of an inadequate intake of vitamin A on egg production and hatchability has been investigated by studying the progressive effect of a vitamin A-deficient diet on White Leghorn pullets and on their eggs. 2. Vitamin A deficiency, while resulting in cessation of egg production and eventual death, and in the production of chickens with low vitamin A reserves, had no apparent effect on fertlity, hatchability or incidence of embryo abnormalities. 3. After a period of high vitamin A intake, birds placed on a vitamin A-deficient ration ceased laying after 120.8 + 26.9 days. The period from cessation of egg production to death from vitamin A deficiency was 44.7 ± 14.3 days. Rate of egg production was only slightly affected before cessation of production. 4. The only constant findings after death from vitamin A deficiency were oral and esophagal "pustules", and accumulation of urates in the kidneys and ureters. Urate deposition on the peritoneum occurred in approximately half of the cases, but ocular and nasal lesions were relatively uncommon.

McDONALD, M. W. and G. L. McCLYMONT. 1954

STUDIES ON NUTRITION OF POULTRY. 4. NUTRITIONAL VALUE OF CONDENSED WHALE SOLUBLES IN CHICKEN RATIONS. *The Australian Vet. Jour., March 1954: 57* (Poultry Exp. Sta. Seven Hills and Vet. Res. Sta., Glenfield).—Condensed whale solubles has been investigated as a protein and B vitamin supplement in chicken rations. The net value of the protein in condensed whale solubles was at least equally as good as that in meatmeal as a supplement to diets based largely on wheat, or wheat and peanut protein. Condensed whale solubles was deficient in some growth factor(s), presumably of the vitamin B complex, supplied by meatmeal, and lucerne meal and whey powder.

McDONALD, M. W., and G. L. McCLYMONT.

HIGH ENERGY CHICKEN RATIONS BASED ON CRUSHED

WHEAT AND MEATMEAL. *Agri. Gaz. N.S.W.*, 1955, *66*, 265-269. [Poultry Exp. Stat., Seven Hills.]—Results are reported of 6 experiments with chickens to demonstrate that high-energy rations based on wheatmeal and high-protein meatmeal, though dearer, are more economical than standard-type rations containing bran and pollards, in that less feed was consumed per lb. weight gain. A source of B vitamins, such as buttermilk powder, and of manganese, to replace those in milling offals is required.—*J. S. Thomson.* (Nutrition Abstracts and Reviews)

McDONALD, M. W. and G. L. McCLYMONT. 1955
STUDIES ON NUTRITION OF POULTRY. 6. THE EFFECT OF A SIMPLIFIED BREEDING RATION ON HATCHABILITY, AND GROWTH AND VIABILITY OF CHICKENS. *The Australian Vet. Journ., Apr. 1955, p. 93* (Poultry Exp. Sta., Seven Hills and Vet. Res. Sta., Glenfield).—The effect of hatchability, and chicken growth and viability, of breeding rations consisting of crushed wheat, mill offals and meatmeal, supplemented with either riboflavin, a mixture of pure B vitamins, or the B vitamin complex rich feeds, whey powder and lucerne meal, has been investigated with White Leghorns. The addition of pure B vitamins or of vitamin B complex rich feeds did not give any significant increase in hatchability above that obtained from the use of pure riboflavin. The presence of vitamin B complex rich feeds in the breeding ration resulted in significantly faster growth of chickens fed an adequate ration in the first three weeks after hatching. Inclusion of a mixture of pure B vitamins in the breeding ration failed to increase the chicken growth rate to the same extent as did five per cent each of whey powder and lucerne meal. Under the conditions of this experiment, breeding rations adequate for hatchability were adequate for viability of chickens under good conditions, but may have affected viability when the chickens were chilled.

MEHRING, ARNON L. JR., HARRY W. TITUS, and JOHN H. BRUMBAUGH. (Lime Crest Res. Lab., Limestone Products Corporation of America, Newton, New Jersey.)
EFFECTS OF TWO SULFONAMIDES ON THE FORMATION OF EGGSHELLS. *Poultry Sci. 34(6):* 1385-1389. 1955.—Fifty and 100 mg daily, oral doses of Diamox (2-acetylamino-1,3,4-thiadiozole-5-sulfonamide) and 35 mg daily doses of benzenesulfonamide each caused laying pullets to produce eggs with very thin shells or with no shells at all, beginning with the 1st egg laid after the initial dose and continuing for a few days after the final dose. Some of the pullets stopped laying.—*A. L. Mehring, Jr.* (Bilogical Abstracts)

MERKER, P. C., L. D. EDWARDS, F. N. ANDREWS, and J. E. CHRISTIAN. (Purdue U. Lafayette, Indiana.)
THE ESTROGENIC ACTIVITY OF RESIDUES OBTAINED FROM CHICKENS TREATED WITH PELLETS OF DIETHYLSTILBESTROL. *Poultry Sci. 34(5):* 1118-1125. 1955.—Three experiments were carried out with a total of 100 Barred Rock cockerels. A portion of the cockerels were implanted with 15 mg pellets containing approximately 12 mg of diethylstilbestrol. An attempt was made to determine the free and conjugated phenoic residues of diethylstilbestrol in the edible portion of the chicken carcass at intervals of from 7 to 35 days after estrogen implanation. A series of extraction procedures including ethanol and ether were used. Extracts were biologically assayed for estrogenic activity with mice using the castrate female uterine weight technique. The free and conjugated phenolic residues obtained from diethylstilbestrol implanted chickens did not display different estrogenic activity from those of untreated chickens.—*F. N. Andrews.* (Biological Abstracts)

MILNE, F. N. J.
STUDIES ON CONDENSED WHALE SOLUBLES IN CHICK STARTER RATIONS. *Queensland J. Agric. Sci.*, 1955, *12*, 21-31. [Poultry Branch, Div. Animal Indust.]—In 2 experiments with chicks reared from 2 to 7 weeks of age condensed whale solubles were used

to replace all or part of the meatmeal in the starter mash. In the first experiment the solubles had been stored for 18 months, and in the second for 5 months. In the second, one group of chicks got condensed whale solubles and livermeal.

In both experiments growth was progessively depressed by increasing amounts of solubles in the ration, and dermatosis developed. In the first experiment there was also high mortality and poor feathering in the groups getting the solubles. In experiment 2 the addition of livermeal improved growth rate over that of a group gettng all fishmeal, and prevented the dermatosis. Deficiency of biotin in the whale solubles was thought to be responsible for the poor performance of the birds. This is discussed.—*T. D. Bell.* (Nutrition Abstracts and Reviews)

MONTGOMERY, P. O'B. (U. Texas Southwestern Med. Sch., Dallas).
EFFECT OF AMNIOTIC FLUID ON CORTISONE INHIBITION OF GROWTH. *Proc. Soc. Exptl. Biol. and Med. 90 (2):* 410-411. 1955.—Cortisone given systemically to day-old chicks is a powerful growth inhibitor for the 18-day period of this study. Partial reversal of this growth inhibitory activity of cortisone may be accomplished by simultaneous adminstration of beef amniotic fluid. (Biological Abstracts)

MORIMOTO, H., S. ARIOSCHI, and **H. HOSHII.** (Natl. Inst. Agric. Sci., Chiba, Japan.)
COMPARISON OF SOME SOURCES OF UNIDENTIFIED CHICK GROWTH FACTORS WITH FISH MEAL. *Poultry Sci. 34(6):* 1392-1395. 1955.—Various fish products and certain microbiological products were fed to chicks to determine their value in comparison with fish meal. Autolyzed cuttle fish, autolvzed sardines, and fish solubles, when fed to chicks, exhibited growth responses that indicated the presence of unidentified growth factors. However, none of these materials was as potent a source of these growth factors as fish meal. Fungi feed gave only a slight growth response. Six koji feeds were tested, but only 2 showed any effect on chick growth. Brewers yeast, and koji feeds (a, and c) were nearly as effective as fish meal in promoting chick growth. Apparently the potency of unidentified chick growth factors in microbiological products is somewhat dependent upon the types of cultures used.—*H .Menge* (Biological Abstracts)

MORIMOTO, H., M. YOSHIDA, H. HOSHII, and **D. KUBOTA.**
NUTRITIVE VALUE OF WOOD YEAST FOR POULTRY FEEDING. *BULL. Nat. Inst. Agric. Sci. Japan* [G], 1954, No. 9 133-140. In Japanese: English summary.—Wood yeast, *Mycotorula japonica,* when given as 2 per cent. of the diet of laying hens had no efefct on egg production or on digestibility of the feed. Normal growth in chickens was obtained when 12 or 20 per cent. of the veast was incorporated in the ration at the expense of soya bean meal. (From summary).—*J. S. Thomson.* (Nutrition Abstracts and Reviews)

MORIMOTO, H., M. YOSIDA, H. HOSHII, and **D. KUBOTA.**
NUTRITIVE VALUE OF KOJI FEED FOR POULTRY FEEDING. *Bull. Nat. Inst. Agric. Sci., Japan* [G], 1954, No. 9 125-131. In Japanese: English summary.—Koji feed is a product of the cultivation of *Aspergillus oryzae* on starch pulp, a by-product in the manufacture of starch from sweet potato, with the addition of ammonium sulfate as a source of N. It contains about 11 per cent. crude protein and up to 60 per cent. N-free extract and has a composition similar to that of wheat bran. Chickens grew well when up to 35 per cent. was substituted for cereal brans. With 25 per cent. of Koji feed in the laying ration egg production was good. (From summary). J. S. Thompson. (Nutrition Abstracts and Reviews)

NAIDOO, D. and **O. E. PRATT.**
THIAMINE PYROPHOSPHATE, ACID AND ALKALINE PHOSPHATASE ACTIVITY IN THE CHICKEN BRAIN IN VITAMIN B_1 DEFICIENCY. *Biochem. biophys. Acta,* 1955, 16, 75-81. [Inst. Psychiat. (Brit. Postgrad. Med. Federation, Univ. London), Maudsley

Hosp.] French and German summaries.—Chicks were maintained from 3 weeks old on a purified diet without vitamin B_1; some of them were given an intramuscular injection of 100 μg. vitamin B_1 daily. When signs of deficiency were established, birds were killed and phosphatases were estimated in the optic tectum by methods described previously (*Biochem. J.*, 1953, 55, 140). The histological distribution of the phosphatases was examined in frozen sections of brain tissue. In the deficient chicks there was an increase in vitamin B_1 pyrophosphatase and in alkaline phosphatase but no significant change in acid phosphatase. In the brain of the chick a vitamin B_1 pyrophosphatase activated only by Mg^{++} over a narrow range of *p*H close to 8.4 was found, in contrast with the vitamin B_1 pyrophosphatase of rat brain, which is activated by Ca^{++} as well as Mg^{++} and has activity over a wider *p*H range, from 6.9 to 9.1.—A. M. Copping. (Nutrition Abstracts and Reviews)

NOWAK, H. Entenmast mit Terramycin und Vigofac.

FATTENING DUCKS WITH TERRAMYCIN AND VIGOFAC. *Arch. Geflügelk.*, 1956, 20, 35-40. [Inst Tierzucht, Hochsch. Bodenkultur, Vienna.] English summary.—There were 4 groups, each of 240 Pekin ducks, fattened from one-day-old for 8 weeks. They received standard rations throughout, with a change to the finishing ration after 4 weeks. Group 1 had no addition; group 2 had terramycin, 22 g. per metric ton in the first ration and 11 g. in the second; group 3 had Vigofac, 9 lb. and then 4.5 lb. per ton; group 4 had both terramycin and Vigofac at the same rates.

Feed intake was almost the same in all 4 groups. Relative weight increases in order from group 1 to 4 were 100, 105.7, 106.0 and 110.9. Relative feed requirements per unit weight increase, in the same order, were 100, 92.5, 91.7 and 89.8. Losses in all 4 groups were small, 2, 1, 1 and 3 ducks, respectively.—D. Duncan. (Nutritional Abstracts and Reviews)

NOZAKI, H., S. HORII and Y. TAKEI.

UTILISATION OF SHELL CA BY CHICK EMBRYO. *Bull. Nat. Inst. Agric. Sci., Japan* [*G*], 1954, No. 9, 89-95. In Japanese: English summary.—^{45}Ca was administered by mouth to 6 laying hens; the first 2 eggs subsequently laid by each were incubated and changes in the distribution of ^{45}Ca were estimated on the fifth, twelfth and eighteenth days and at hatching. During incubation the shell lost about 150 mg. Ca. In the early stages of embryonic development the Ca was derived mainly from the yolk and white. In the middle stages the Ca of the amniotic and allantoic fluids was derived mainly from the yolk In the last half of incubation more than half the Ca in the embryo came from the shell, one-quarter from the yolk and the rest from the white. In the final stage yolk was the main supply of Ca to the embryo, the yolk receiving a considerable supply of Ca from the shell.—J. S. Thompson. (Nutrition Abstracts and Reviews)

OLOUFA, MOHAMED M. (Cairo U., Egypt.)

EFFECT OF THYROPROTEIN ON THE GROWTH OF EGYPTIAN BABY CHICKENS. *Poultry Sci. 34(6)*: 1292-1294. 1955.—A total of 320 Egyptian chickens were used to study effect of 2 dosages of thyroprotein on growth rate from hatching until 12 weeks of age. Results indicated that feeding thyroprotein at the recommended dosage of 10g/100 lb. of feed caused significant depression in growth rate. The lower rate of 5 g thyroprotein/100 lb. of feed, however, had no apparent effect on growth except after 4 weeks when it depressed the growth rate.—M. M. Oloufa. (Biological Abstracts)

ROBBLEE, A. R. and D. R. CLANDININ.

THE USE OF 2-AMINO, 5-NITROTHIAZOLE FOR THE INDUCTION OF MOULT IN YEARLING HENS. *Poultry Sci. 34(5)*: 991-995. 1955.—Addition of 0.1% 2-amino, 5-nitrothiazole to an all-mash breeding ration was found effective in inducing a molt in yearling hens. No mortality resulted from use of the drug at this level for a treatment period of 26 days. Subsequent production on a hen-housed

basis, was higher in hens that were force-moulted by adding 2-amino, 5-nitrothiazole to the ration than in hens that were force-molted by restricting feed intake. No difference in producton rate was apparent when calculated on a hen-day basis.—Auth. summ. (Biological Abstracts)

ROSENBERG, HANS R., J. T. BALDINI, (E. I. du Pont de Nemours. Stine Lab., Newark, Del.), **M. L. SUNDE, H. R. BIRD,** (U. Wisconsin, Madison), and **T. D. RUNNELS.** (U. Delaware, Newark.)
THE CONCOMITANT USE OF FAT AND METHIONINE IN BROILER DIETS. *Poultry Sci. 36(6)*: 1308-1313. 1955.—Using a simple corn-soybean oil meal type diet, a small improvement in performance was seen when 0.05% DL-methionine was added to the rations. Supplementation of the basal ration with 3%-6% fat brought about considerable improvement in performance, especially in efficiency of feed utilization. When both fat and methionine were added an even greater improvement was seen. This fat-methionine interaction was noted in experiments carried out in 3 different laboratories and was further noted in exploratory experiments with 2 different diets of more varied composition.—J. T. Baldini. (Biological Abstracts)

SCHLAMB, KERMIT F. (North Dakota Agric. Coll., Fargo.), **C. O. CLAGETT,** and **REECE L. BRYANT.**
COMPARISON OF THE CHICK GROWTH INHIBITION OF UNHEATED LINSEED HULL AND COTYLEDON FRACTIONS. *Poultry Sci. 34(6)*: 1404-1407. 1955.—Inhibition of chick growth by addition of linseed meal to the diet reported by a number of workers was studied using meal separated into hull and cotyledon fractions. The extracted unheated linseed meal or hull or cotyledon fraction was added to the diet as a partial replacement of soybean meal on the basis of protein content. The unheated linseed meal supported a growth rate of approximately 30% of the control. Replacement with ground extracted hulls supported growth at a rate of approximately 75% of the control. The cotyledon fraction added to the diet supported a rate of growth 40% that of the control. In the separation of the meal a small middling fraction results; this fraction was not tested. Most of the inhibition seen in these trials resided in the cotyledon fraction. This is contrary to a previous report which suggested the mucilage of the hull was the inhibitory agent.—C. O. Clagett.—(Biological Abstracts)

SCHOETTLE, C. E. (U. Illinois, Urbana), **E. F. REBER, J. O. ALBERTS,** and **H. M. SCOTT.**
A STUDY OF NEW HAMPSHIRE X BARRED COLUMBIAN CHICKS FROM TWO DAYS TO TEN WEEKS OF AGE. 1. GROWTH; ORGAN WEIGHTS; LIVER FAT AND PROTEIN; FEMUR AND TIBIA FAT AND ASH OF CHICKS FED A RATION FREE OF ANTIBIOTICS AND COCCIDIOSTATS. *Poultry Sci.* 35 (1): 95-98. 1956.—New Hampshire x Barred Columbian chicks from 2 days to 10 weeks of age were fed a ration free of antibiotics and coccidiostats. Five chicks were weighed and sacrificed each week to obtain organ and bone weights. Chemical analyses of livers, femurs, and tibias were made. Fat and determinations are reported on the livers. Fat and ash values are reported on the bones. The growth curve is practically a straight line relationship with an average weight of 1432 g at 10 weeks of age. When expressed as per cent weight, the gall bladder plus bile weights were affected very little by age. After the 3d week the spleen weights on percent body weight basis were not greatly affected by age. There was a gradual decrease in liver weights, when expressed as percent body weight, throughout the growth period. The liver fat remained approximately 16% after the 1st week. Liver protein increased from 45% at 2 days of age to near 70% the 1st week where it remained throughout the growth period. Age seemed to have little effect on fat and ash content of the leg bones.—Auth. summ. (Biological Abstracts)

SCOTT, H. M., W. D. MORRISON, and **PAUL GRIMINGER.** (U. Illinois, Urbana.)
STUDIES ON UNKNOWN GROWTH FACTORS IN DISTILL-

ERS DRIED SOLUBLES. *Poultry Sci.* 34(6): 1446—1447. 1955—Addition of 10% distillers dried solubles to a purified diet significantly improved chick growth whereas the ash of distillers solubles failed to stimulate chick growth.—H. M. Scott. (Biological Abstracts)

SINGSEN, E. P., L. M. POTTER, L. D. MATTERSON, R. H. BUNNELL, ANNA KOZEFF and E. L. JUNGHERR.

STUDIES ON ENCHALOMALACIA IN THE CHICK. 4 THE INFLUENCE OF OIL IN FISH MEAL, OILS FROM VARIOUS SPECIES OF FISH, AND ANIMAL FATS ON THE INCIDENCE OF ENCEPHALOMALACIA. *Poultry Sci.* 34(5): 1075-1079. 1955.—Four experiments were carried out in which chicks from dams fed a simplified vitamin E-low diet were used to compare encephalomalacia-producing properties of oils from different species of fish, compare encephalomalacia-producing properties of oil in fish meal with an oil extracted from the same species of fish, test the effect of low-grade animal fats and the fat in meat scrap on the incidence of encephalomalacia, and obtain further data on the minimum level of fish oil necessary to induce encephalomalacia under our experimental conditions. Results indicated: The effectiveness of a fish oil in causing encephalomalacia is correlated with its I number, which reflects the degree of unsaturation of the oil. Addition of from 0.5% to 1.0% of a highly unsaturated fish oil to a vitamin E-low diet is sufficient to cause encephalomalacia in vitamin E-deficient chicks. Oil in Menhaden fish meal is as effective in producing encephalomalacia as extracted Menhaden oil. The fat in samples of meat and bone scrap and unstabilized yellow grease fed in these experiments did not tend to cause encephalomalacia.—L. D. Matterson. (Biological Abstracts)

SQUIBB, ROBERT L., and J. EDGAR BRAHAM. (Inst. Agropecuario and Inst. Nutricion, Guatemala, C. A.)

BLOOD MEAL AS A LYSINE SUPPLEMENT TO ALL-VEGETABLE PROTEIN RATIONS FOR CHICKS. *Poultry Sci. 34(5):* 1050-1053. 1955.—A commercial blood meal, prepared from bovine blood, was found to be a good source of lysine when fed to chicks at levels of 2 to 4% of an all-vegetable ration. Further increase of the amount of blood meal resulted in either no supplementary effect or in depression of growth.—R. L. Squibb. (Biological Abstracts)

SQUIBB, ROBERT L., J. EDGAR BRAHAM, MIGUEL GUZMAN, and NEVIN S. SCRIMSHAW. (Inst. Agropecuario and Inst. Nutricion, Guatemala, C.A.)

BLOOD SERUM TOTAL PROTEINS, RIBOFLAVIN, ASCORBIC ACID, CAROTENOIDS AND VITAMIN A OF NEW HAMPSHIRE CHICKENS INFECTED WITH CORYZA, CHOLERA OR NEWCASTLE DISEASE. *Poultry Sci. 45(5):* 1054-1058. 1955.—Three poultry diseases were studied in relation to their nutritional effects on New Hampshire chicks. Infection with coryza resulted in a significant reduction of serum ascorbic acid, total carotenoids and vitamin A. Serum total proteins were elevated and little or no effect was observed on riboflavin. Cholera infection resulted in a significant increase of serum total proteins and ascorbic acid, while total carotenoids and vitamin A serum levels were significantly depressed; depression was also observed on serum amylase activity. Newcastle disease significantly reduced total serum proteins, vitamin A and total carotenoids, and elevated serum ascorbic acid. No effect was observed on riboflavin. Findings suggest that the value of nutritional measures in the therapy and prophylaxis of birds infected with these diseases should be investigated.—R. L. Squibb. (Biological Abstracts)

SWANSON, M .H., P. E. WAIBEL, N. V. HELBACKA, and E. L. JOHNSON. (U. Minnesota. St. Paul.)

SHELL EGG QUALITY AS AFFECTED BY ARASAN IN THE DIET. *Poultry Sci. 35(1):* 92-95. Illus. 1956.—Graded levels of Arasan, a fungicidal product containing tetra-methylthiuram (TMTD) as the active ingredient for seed treatment, were added to the diets of laying

hens. Low levels (10-50 ppm TMTD) resulted in reduction in shell thickness and albument firmness. Many eggs were also misshapen, and a significant proportion were laid prematurely with little or no shell disposition. At levels above 100 ppm practically no hard-shelled eggs were produced. On withdrawal of TMTD from the diet, recovery was rapid and apparently quite complete.—M. H. Swanson. (Biological Abstracts)

SWART, L. G.
LUPINS IN LAYING RATIONS. *Farming in S. Africa*, 1955, 30, 404-406. [Stellenbosch-Elsenburg Coll. Agric., Etellenbosch.]—Rations with up to 10 per cent. sweet lupin meal replacing part of the fishmeal did not decrease egg production significantly, but higher amounts, replacing most or all of the fishmeal, did. Egg weight also decreased as the amount of sweet lupin meal increased, and feed eaten per dozen eggs produced rose. There was no effect on hatchability. Experiments on the feeding of bitter blue lupin meal had to be discontinued because it imparted a bitter taste to the eggs.—J. S. Thompson. (Nutrition Abstracts and Reviews)

THORNTON, P. A., P. J. SCHAIBLE, J. A. DAVIDSON and D. A. LIBBY.
THE EFFECT OF METHIONINE IN TURKEY STARTING AND GROWING FEEDS. Michigan State Univ. Agric. Exptl. Sta., Quart. Bull. 37(3): 301-306. 1955.—Three different turkey growing rations supplemented with methionine hydroxy analogue at 1 pound methionine per ton of feed produced significantly greater growth rates in 2 of 3 groups of male turkeys; weights of females were not affected. Supplemental methionine had no effect on feed efficiency up to 8 weeks of age; however improvement was shown for all rations by 24 weeks. Results indicate that methionine is more beneficial during the later stages of growth than earlier and males respond more than females.—P. A. Thornton. (Biological Abstracts)

VANSTONE, W. E., W. A. MAW, and R. H. COMMON. (McGill U., MacDonald Coll., Quebec, Canada.)
LEVELS AND PARTITION OF THE FOWL'S SERUM PROTEINS IN RELATION TO AGE AND EGG PRODUCTION. Canadian Jour. Biochem. and Physiol. 33(6): 891-903. Illus. 1955.—The level of total serum protein in the fowl was followed from the 14th day of incubation to the 13th week of egg production. Serum proteins were fractionated concurrently by zone electrophoresis in filter paper. Serum protein level in the 14-day embryo was 0.9 g/100 ml and the protein comprised a prealbumin fraction, albumin, $alpha_2$- and beta-globulins. Sera from chicks aged 7 days, no longer contained a prealbumin fraction but $alpha_1$-, $alpha_2$-, and gamma-globulin fractions had appeared by this stage and the protein level had reached 2.3 g/100 ml. Total serum protein in females increased to a maximum of about 5.4 g/100 ml in the week before laying of the 1st egg. By that time 2 new protein fractions had appeared. These new fractions accounted for the greater part of the increase over the levels (4 g/100 ml) prevailing in the prepuberal stage. Serum protein level declined during the 1st 3 weeks of laying to average levels below 4 g/100 ml; and this decline appeared to affect albumin and $alpha_1$-globulin and the new fractions. As laying progressed, the total serum protein tended to regain a level around 4 g/100 ml. The electrophoretic pattern also tended to return towards that prevailing in the week before laying. Some tentative correlations of results of zone electrophoresis with published results for free electrophoresis of fowl serum proteins are presented.—Auth. abst. (Biological Abstracts)

VASKOV, B. 1955 [Coll. Agric. For., Univ. Skoplje.] O uticaju stilbestrola na prirast i tov leghorn-petlica.
THE EFFECT OF STILBOESTROL ON THE GROWTH AND FATTENING OF LEGHORN COCKERELS. *Veterinaria* [*Sarajevo*], 4: 58-68. [English summary.]—Twenty 3-mth-old and ten 6-mth-old Leghorn cockerels were each injected subcutaneously wth 15 mg. stilboestrol. In 90 and 60 days in the 2 groups resp. rate of growth was

slightly but not significantly greater than that of the controls. Slaughter yields and meat quality were better than in the controls. The effect of stilboestrol ceased and the comb regenerated in some birds before the end of the experimental period.—Abstract of summary. (Animal Breeding Abstracts)

WAIBEL, P. E., A. B. MORRISON, and L. C. NORRIS. (Cornell U., Ithaca, New York.)
PRODUCTION OF DEPLETED CHICKS BY FEEDING MATERNAL DIETS DEFICIENT IN UNIDENTIFIED GROWTH FACTORS. *Poultry Sci. 34(6)*: 1322-1329. 1955.—Results of experiments showed that chicks of hens fed a purified diet adequate in known nutrients were depleted of unidentified growth factors. Male chicks were more depleted than female chicks. While the percentage response of adequately fed chicks of hens receiving depletion diets was almost equal, the final weight of adequately fed chicks of hens receiving the purified diet was consistently less than that of adequately fed chicks from groups of hens receiving the corn-soybean meal diet and the supplemented corn-soybean meal diet. This suggested depletion of a factor(s) either not supplied by the mixture of unidentified factor supplements in the diet of the adequately fed chicks, or supplied in insufficient amounts. Hens fed a corn-soybean meal diet did not appear to require the unidentified factors of liver and fish solubles to maintain body weight, egg production, fertility, hatchability, or progeny livability. Hens receiving a purified glucose-soybean protein diet performed similarly, except that percentage egg production was decreased.—Authors. (Biological Abstracts)

WILCOX, R. A., C. W. CARLSON, W. KOHLMEYER, and G. F. CASTLER. (South Dakota Agric. Exptl. Sta., College Station.)
THE AVAILABILITY OF PHOSPHORUS FROM DIFFERENT SOURCES FOR POULTS FED PRACTICAL-TYPE DIETS. *Poultry* Sci. 34(5): 1017-1023. 1955.—The P in samples of "colloidal" phosphate appeared mainly unavailable to turkey poults having this as a P supplement in their diets from hatching date to 4 weeks of age. One sample each of a commercial dicalcium phosphate, a defluorinated phosphate and an imported rock phosphate appeared low in availability while other smples of similar phosphates were more satisfactory. The source of raw material and processing both seem to have effects on the availability of the element to poults. Monobasic calcium phosphate, a sample of steamed bone meal, 2 samples of commercial dicalcium phosphate and a sample of a defluorinated phosphate contained readily available phosphorus.—R. A. Wilcox (Biological Abstracts)

WISEMAN, R. W., O. A. BUSHNELL, and M. M. ROSENBERG. (U. Hawaii, Honolulu.)
EFFECT OF RATIONS ON THE pH AND MICROFLORA IN SELECTED REGIONS OF THE INTESTINAL TRACT OF CHICKENS. *Poultry Sci. 35(1)*: 126-132. 1956.—Feeding yellow corn meal or B-grade molasses did not influence the pH of selected regions of the intestinal tract. However, a flora smaller than that obtained from the control group, was observed in pullets fed the B-grade molasses ration. The "aerobes" and lactobacilli were used as indicators to measure response of bacterial flora to contrasting diets. Lower populations of bacteria were recovered from the more acid regions while the counts increased as the pH of the tract approached neutrality. The alkaline pH of the contents of the large intestine and of the droppings collected at the time of sacrifice was associated with a reduction in bacterial counts, especially of lactobacilli. The increased water intake of molasses-fed birds may partially explain the reduced bacterial flora encountered in this group of test chickens, either by dilution or by increasing movement through the intestinal tract. The more rapid digestion of B-grade molasses than yellow corn, might also affect bacterial growth, since less carbohydrates would be available from the molasses ration for bacterial multiplication throughout the posterior regions of the alimentary canal.—From auth. summ. (Biological Abstracts)

ZNANIECKA, G., J. WODZINOWSKI, H. CIECHANOWSKA, H. KORZENIEWSKA, and H. WECKÓWICZ. Wplyw suszonki z mlodej pokrzywy na niesnosc kur i fylegowosc jaj.

THE EFFECT OF NETTLE MEAL ON EGG PRODUCTION AND HATCHABILITY OF HENS. *Rocz. Nauk rol.* [*B*], 1954, 68, 271—281. [Inst. Zootech., ZZD Pawlowice.] Russian and English summaries.—Replacement of 5 g. alfalfa meal by 5 g. nettle meal in the winter ration of hens slightly increased the number of eggs produced, but the average weight of eggs was reduced. There was no effect on egg fertility, but hatchability was slightly improved. (From summary.) —J. S. Thompson. (Nutrition Abstracts and Reviews)

PATHOLOGY

ARANEZ, JOSE B., and TEODULO M. TOPACIO, Jr. (U. Philippines, Quezon City.)

LIPOMA IN A TURKEY. Jour. Amer. Vet. Med. Assoc. 126(936): 179-180. 1955.—An 1.5 inch diameter surface growth surgically removed from a 2.5 year female turkey was described as a lipoma.—J. E. Ryff. (Biological Abstracts)

BURMESTER, B. R., and NELSON F. WATERS. (U. S. Regional Poultry Res. Lab., East Lansing, Mich.)

THE ROLE OF THE INFECTED EGG IN THE TRANSMISSION OF VISCERAL LYMPHOMATOSIS. *Poultry Sci. 34(6)*: 1415-1429. Illus. 1955.—A total of 285 chickens, the progeny of 16 dams which were typed with respect to shedding of the virus of visceral lymphomatosis, were hatched and brooded in family isolation units. There was no significant difference between families of dams that shed the virus and families of dams that did not shed the virus, with respect to incidence of visceral lymphomatosis. Experiments involving 343 chickens of susceptible but disease-free stock were distributed among 5 lots and exposed during the hatching and brooding periods to chicks of an infected stock. Results indicate that a high rate of transmission occurred during the brooding period but not during the hatching period. The latter occurred despite the fact that an inoculum prepared from debris in the hatcher caused a high incidence of tumors in inoculated chickens. In a 3rd experiment involving 401 chickens negative results were obtaned in an attempt to increase occurrence of lymphomatosis by introducing into a commercial hatcher unit during the hatching period 2 different preparations of known relative potency containing virus of visceral lymphomatosis.—B. R. Burmester. (Biological Abstracts)

BUZA, L.

EXPERIMENTS ON THE IMMUNIZATION OF BABY CHICKS AGAINST FOWL-PEST (Kisérletek napos csibék baromfipestis elleni aktiv immunizálására) Magyar Allatorvosok Lapja, Budapest, 2: 43-47, 1956.—As fowl-pest (Newcastle disease) has repeatedly occurred among baby chicks, immunizing experiments were made by the application of the Hertfordshire and Lederle live virus vaccines diluted in the usual way and dropped into the nose, mouth and on the conjunctiva of baby chicks. In practice it seemed to be most convenient to drop the vaccine in the fossa palatina by means of an eyedropper. Results of the treatment on several thousand chicks show that by such means an immunity lasting for 6 to 8 weeks can be attained. Therefore, in case of the spreading of the Newcastle disease the author recommends an immunization of chicks aged a few days or weeks by the above procedure. (Hungarian Agricultural Review. 2. 1956)

DAS, M. S. (Directorate Vet. Serv., Calcutta), and **M. S. JAYARAMAN.** (Asst. Dis. Invest. Officer, Hyderabad.)

ISOLATION OF A RARE SPECIES OF SALMONELLA (SALMONELLA ALACHUA) FROM ACUTE OUTBREAKS AMONGST

POULTRY IN INDIA. *Poultry Sci. 34(5)*: 1048-1049. 1955.—*S. alashua*, an organism not previously reported from animals or humans, was isolated from chicks in a number of severe outbreaks of suspected salmonellosis on farms in Bombay. On a study of its experimental pathogenesis in mice and chicks, the organism was found to be infective in mice and chicks when inoculated either orally or subcutaneously. Mortality was less following oral administration. The disease which was more acute in young chicks was characterized by diarrhea, dropped wings and lack of coordination followed by prostration with no loss of muscular reflexes.—Authors. (Biological Abstracts)

26551. **GARREN, HENRY W., and C. W. BARBER.** (North Carolina State Coll., Raleigh.)
ENDOCRINE AND LYMPHATIC GLAND CHANGES OCCURRING IN YOUNG CHICKENS WITH FOWL TYPHOID. *Poultry Sci. 34(6)*: 1250-1258. Illus. 1955.—Young New Hampshires and Rhode Island Reds experimentally inoculated with *Salmonella gallinarum* exhibited a number of changes during a 2 week period. Among these were: (1) drop in feed and water consumption, (2) decrease in body weight, (3) heavy mortality, (4) pituitary hypertrophy, (5) tremendous adrenal enlargement caused by interrenal hypertrophy, (6) involution of the bursa of Fabricius, and (7) histological evidence of decreased thyroid activity. Decreased thyroid activity was induced in a control group of chickens by restricting feed and water intake to that of the experimental group. Histologically, the lymphatic follicles of the bursae from the experimental chickens were in various stages of involution. The only pronounced effect following inoculation of young White Leghorns with fowl typhoid organisms was decreased bursa weight. The possibility that changes noted in the endocrine glands and the bursa of Fibricus could have resulted from adverse physiological conditions induced by successful infection rather than the chickens' attempt to resist infection was suggested. (Biological Abstracts)

GORDON, R. F. (Poultry Research Station, Houghton, England)
INCUBATION HYGIENE. Agricultural Review, March 1956.—Egg transmission of avian diseases presents various problems. In order to control egg-borne infections the following are necessary: the detection of carriers by diagnostic tests and their removal from the breeding flock; the hygiene of the egg; the hygiene of the incubator; the hygiene of the hatchery premises; the hygiene of the hatchery personnel and finally therapy. Methods to accomplish these are discussed. The more closely the standard of hygiene can approach to perfection, the greater will be the chance of escaping those infections which can have such far-reaching effects on the entire poultry industry.

HARRY, E. G. (Poultry Research Station, Animal Health Trust, Houghton, England)
THE APPLICATION OF AEROSOLS TO ATMOSPHERIC AND SURFACE DISINFECTION IN THE POULTRY INDUSTRY. I. THE DISINFECTION OF SURFACES AND DUST DEPOSITS USING THE MICROSOL AEROSOL GENERATOR. *The Vet. Record 67*:1109, Dec. 17, 1955.—(1) The use of the Microsol aerosol generator for the disinfection of surfaces, deposition of gemicidal films and the immobilisation and disinfecton of dust particles has been described, and its application to disease control in hatcheries, broiler houses and other farm buildings has been commented on.

(2) It has been shown that the mode of action of the aerosols generated depends to a large extent on their physical characteristics.

(3) An aerosol of large particle size composed of six parts Ibcol and four parts triethylene glycol when generated in a concentration of 4 fl. oz. per 100 sq. ft. has been shown to be effective for depositing a duct-adhesive film on horizontal surfaces.

(4) A film of the above composition was found capable of retaining its adhesive properties for at least one month on non-absorbent surfaces and its disinfecting activity was only slightly reduced after 17 days. It was also found to have a marked disinfecting activity on *S.*

pullorum infected dust.

(5) An aerosol of small particle size composed of a volatile germicide such as formalin was found effective in disinfecting surfaces other than horizontal ones. Two fl. oz. per 100 cu. ft. air space was found capable of producing a minimum of 99.8 per cent reduction in the numbers of *S. pullorum* on the interior surfaces of an incubator room.—(Author)

HARRY, E. G. (Houghton Poultry Research Station, England)
THE APPLICATION OF AEROSOLS TO ATMOSPHERIC AND SURFACE DISINFECTION IN THE POULTRY INDUSTRY. II. ATMOSPHERE DISINFECTION AND ITS VALUE AS A MEANS OF CONTROLLING CROSS INFECTION. *The Veterinary Record 68*: 334, 1956.—(1) The significance of the contamination of the atmosphere with bacteria and viruses on the transmission of infectious diseases has been emphasized.

(2) The mode of action of chemical vapours on airborne microorganisms has been outlined with particular reference to the value of aerosols for disseminating such vapours. (3) Methods of producing aerosols have been detailed and suggestions have been made on the most suitable applications of the various types of generators described.

(4) The necessity of maintaining the concentration of vapour in the atmosphere at or above minimum germicidal levels for a sufficient time to reduce the microbial population to desirable levels is stressed. In this connection attention has been drawn to the effect of ventilation and chemical and physical absorption on the persistence of vapours in the atmosphere.

(5) A method of generating supraminimal bactericidal concentrations of vapor intermittently has been described for use in sites where the atmospheric infectivity rate is low and estimation of vapour concentration levels is not possible. (6) Attention has been drawn to the effect of the relative humidity of the atmosphere and degree of desiccation of bacteria, on the bactericidal activity of the vapours used for air disinfection, and the effect these factors have on the value of air disinfection in the field. In this connection the importance of dust control measures in conjunction with air disinfection has been emphasized.

(7) The effect of the size of the infected particles on their relative infectivity and resistance to disinfection has been discussed, with reference to the interpretation of the value of air disinfection based on reductions obtained in total bacterial population. (8) Attention has been drawn to the difficulty with which the value of air disinfection can be determined from the results of field trials. The principal reason has been shown to be the lack of knowledge of the relative importance of airborne and contact infection in the trials described.

(9) It is concluded that an assessment of the probable importance of the role of direct contact in the dissemination of infection in each particular environment should be made before air disinfection measures are adopted as a means of restricting cross infection. In environments where direct contact is likely to be the principal mode of infection, the use of air disinfection is likely to be of little value. (10) The potential value of air disinfection in sites where contact infection can be limited, as in hatcheries, battery houses and poultry houses during stock turnover, has been commented on. (Author)

HORTON-SMITH, C. and **P. L. LONG** (Poul. Res. Sta., An. Health Trust, Houghton, Huntingdon, Eng.)
STUDIES IN HISTOMONIASIS. I. THE INFECTION OF CHICKENS (GALLUS GALLUS) WITH HISTOMONAD SUSPENSIONS *Parasitology 46*: 79-90, 1956.

1. Suspensions made from infected caecal material, derived from chickens which had been artificially infected with *Histomonas meleagridis* by the administration of embryonated *Heterakis ova*, can be used to transmit the organisms to other chickens when administered *per os*.

2. Infections with histomonad suspensions can only be obtained in chickens that have been starved, or in chickens that are feeding but have received an alkali mixture immediately before the suspension is administered. The highest incidence of infections is obtained by admin-

istering suspensions to starved chickens that have received 1 g. alkali mixture beforehand.

3. Successful infection appears to depend upon the pH of the gizzard and, possibly, of the upper intestine. The incidence of lesions produced by feeding suspension is increased as the contents of the gizzard become alkaline. It is also suggested that the consistency of the food may play a part, as coarse food, along with the infective material, is retained in the gizzard until it is completely ground up and mixed with the gastric juice.

4. In one series of passages the suspension became attenuated after fourteen passages through chickens. In other cases suspensions became attenuated after only six passages through chickens.

5. The courses of infections produced by histomonad suspensions and *Heterakis* ova are compared.

6. The advantages of the method of using histomonad suspensions are discussed in their relation to the screening of chemotherapeutical agents. (Authors)

HORTON-SMITH, C., and **P. L. LONG,** (Poultry Research Station, Animal Health Trust, Houghton, England)

FURAZOLIDONE IN THE CONTROL OF HISTOMONIASIS (BLACKHEAD) IN TURKEYS. *Jour. Comparative Path. and Therapeutics* 66:22-34, 1956—Furazolidone at concentrations of 0.01 to 0.02 per cent w/w in the food is almost wholly effective in preventing histomoniasis induced by feeding Heterakis ova to turkeys when continuous medication is commenced before the ova are administered. It is suggested that 0.015 per cent w/w furazolidone in the feed is a suitable concentration to use for preventive medication. Treatment with 0.04 per cent w/w furazolidone in the food, delayed for ten days following the administration of Heterakis ova prevented deaths from histomoniasis when continued for fourteen days. It is suggested that treatment of established histomoniasis with a 0.04 per cent furazolidone medicated food be followed by a course of preventive therapy with a 0.01 per cent in the food to combat disease arising from reinfection or relapse. The action of furazolidone on histomonads is inhibitory, directly or indirectly, and the protozoa proceed to multiply if medication is withdrawn or is used at very low concentrations in the food.

Furazolidone at a concentration of 0.015 per cent in the food failed to prevent the development of disease caused by one species of turkey coccidum (suspected *E. adenoeides*). Owing to the testicular changes observed in treated fowls, the medication of breeding stock is contraindicated. Further work is necessary to determine the relations existing between the recurrence of disease and the time and level of medication. (Authors)

LECCE, JAMES G., and **F. GEORGE SPERLING.** (Sch. Vet. Med., U. Pennsylvania, Kennett Square.)

CHRONIC RESPIRATORY DISEASE. III. THE EFFECT OF TREATMENT ON THE PLEURO-PNEUMONIA-LIKE ORGANISM FLORA OF AVIAN TRACHEAS. *Journ. Amer. Med. Assoc. 127(940)*: 54-56. 1955.—Inoculated and natural cases repeatedly yielded pleuropneumonia-like organisms (PPLO) but treatment of the chickens for 5 days with Terramycin or Aureomycin in water or a single subcutaneous injection of Terramycin in oil resulted in inability to recover PPLO. Nine weeks later, PPLO could again be isolated. This parallels the observation that field outbreaks may be followed by a relapse 2 months after treatment. It is suggested that flocks with chronic respiratory disease be treated with high level antibiotics and vitamin reinforced feed for 5 days, and this regimen be repeated every 30 days while the flock is under stress. An infected flock so handled maintained high egg production throughout the winter.—J. F. Ryff. (Biological Abstracts)

MACK, WALTER N., and **ACHIT CHOTISEN.** (Michigan State U., East Lansing.)

BETA-PROPRIOLACTONE AS A VIRUS ALTERING AGENT FOR A NEWCASTLE DISEASE VACCINE. *Poultry Sci. 34(5)*: 1010-

1013. 1955.—A vaccine was made by adding 0.025% beta-propiolactone (BPL) to Newcastle disease virus (NDV), followed by heating 2 hours at 37°C. When the BPL-NDV mixture was injected into 43 chickens, no evidence of Newcastle disease resulted. Sixteen days after vaccination, the 43 vaccinated birds and 39 unvaccinated birds received a challenging injection of 0.2 ml of NDV virus ($10^{-9.5}LD_{50}$) suspension. No disease resulted in the 43 vaccinated chickens while 97.4% (38 infected out of 39) of the unvaccinated birds developed Newcastle disease. Hemagglutination inhibition (HI) tests on paired blood sera from the vaccinated group showed that all birds gave substantially increased HI titers. Advantages in a vaccine made by this method are suggested.—Auth. summ. (Biological Abstracts)

NATT, MICHAEL P. (Eaton Labs., Norwich, N. J.) and **CHESTER A. HERRICK.** (U. Wisconsin, Madison.)

THE EFFECT OF CECAL COCCIDIOSIS ON THE BLOOD CELLS IF THE DOMESTIC FOWL. I. A COMPARISON OF THE CHANGES IN THE ERYTHOCYTE COUNT RESULTING FROM HEMORRHAGE IN INFECTED AND MECHANICALLY BLED BIRDS. THE USE OF THE HEMATOCRIT VALUE AS AN INDEX OF THE SEVERITY OF THE HEMORRHAGE RESULTING FROM THE INFECTION. *Poultry Sci. 34(5)*: 1100-1106. 1955.—The erythrocyte count per mm^3 of blood of birds infected with cecal coccidiosis was shown to decrease approximately 50% on the 5th and 6th days of infection and required 8 days following blood loss to return to normal. The hematocrit value also decreased in the same magnitude and on the same days as the erythrocyte count, and required about the same number of days to return to normal. The parallelism in the changes in the erythrocyte count and the hermatocrit value through the course of the infection permits the use of the hematocrit as a quick and easy method for determining severity of hemorrhage resulting from coccidial infection.

A series of birds were bled mechanically via cardiac puncture, removing 30% of the blood vol. in one prolonged bleeding and 11, 29, and 48% of the blood vol. in 10 successive bleedings. When comparable amounts of blood were withdrawn from animals by the 2 methods, a greater decrease in erythrocytes resulted from the prolonged bleeding procedure. The same drop in hematocrit value occurred when 29 and 48% of the blood vol. was removed over a 20 hour period. It required 4 days for the count of the 11% group and 7 days for the count of the remaining groups to reach a value comparable to that of the controls. The time required for the erythrocyte counts of the latter 2 groups to return to normal agreed with that found in the coccidial study.—Auth. summ. (Biological Abstracts)

NIGHTALL, E. W.

A STUDY OF THE INCIDENCE OF LYMPHOMATOSIS IN POULTRY KEPT AT THE UNIVERSITY OF NOTTINGHAM, SCHOOL OF AGRICULTURE. *Poultry Sci. 35(1)*: 109-125. 1956—Battery housed birds in this flock have a significantly lower level of lymphomatosis than birds housed on the other systems, and Light Sussex have less lymphomatosis than Rhode Island Reds and White Leghorns. The cross between the Rhode Island Reds and Light Sussex have less lymphomatosis than either of the pure strains or other crosses in the same flock. Deaths from visceral lymphomatosis occurred more when birds were in production than at other times, while deaths from neural lymphomatosis occurred mainly at or before maturity. An estimate of the heritability of the susceptibility to lymphomatosis in the strain of Light Sussex was 0.0088, and in the strain of Rhode Island Reds was 0.0542.—E. W. Nightall., (Biological Abstracts)

PELLERDY, L.

CONTRIBUTION TO THE OCCURRENCE OF COCCIDIOSIS OF THE SMALL INTESTINES OF CHICKENS IN HUNGARY. (Adatok a csirkék vékonybél coccidiosisanak elofordulasahoz Magyarorszagon) Magyar Allatorvosok Lapja. Budapest, 1: 9-11, 1956.—Beside cecal coccidiosis due to Eimeria tenella, sporadic cases of coccidiosis caused by E. necatrix and E. brunetti) (in a mixed infection)

have also been found for years in Hungarian chickens. The oocysts of E. necatrix are similar in share to those of E. tenella but they are of a smaller size (13 — 23 × 11 — 14 μ as against 19 — 26 × 16 — 23 μ in E. tenella). Largest numbers of oocysts are to be found in the mucous membrane of the small intestines. The disease manifests itself in a grave haemorrhagic inflammation of the mucus of the small intestines and causes protracted enzooties within the flock. Ultraseptyl and Sulfaquinoxalin give good results in the control of necatrixcoccidiosis but it is equally important to prevent a reinfection of the chickens. (Hungarian Agricultural Review. 2. 1956.)

RICHTER, J. (Nobilis Laboratory, Boxmeer, Netherlands)
INFECTIEUZE BRONCHITIS. Vlaams Diergeneeskundig Tijdschrift 25: 133-144. 1956.—The symptoms which appear in chickens and laying hens by the virus of infectious bronchitis are described. The principle of the serum neutralization test is mentioned. By means of this test many positive cases of bronchitis were found. The author succeeded in isolating the virus and in provoking the disease in chickens by means of the isolated virus. It proved to be possible to isolate bronchitis virus again from these chickens. The preparation of a vaccine is briefly described and some vaccination-results are stated. (Authors)

SHARP, D. G., DOROTHY BEARD, and J. W. BEARD. (Duke Univ. Sch. Med., Durham, N. C.)
MORPHOLOGY OF CHARACTERISTIC PARTICLES ASSOCIATED WITH AVIAN ERYTHROBLASTOSIS. Proc. Soc. Exptl. Biol. and Med. 90(1): 168-173. 1955.—A particulate component, which may be the etiological virus, was isolated by ultracentrifugation of the blood plasma of chickens with erythroblastosis. The particles were of spheroidal shape and variable size, averaging approximately 102 m_μ in diameter. Micographs of unshadowed preparations showed circular images of an appearance suggesting that the particles consisted predominantly of a watery, low-electron contrast, gel-like material surrounding a small relatively dense internal structure. Findings were compared with those obtained in the analogous studies of particles representing the virus of myeloblastosis and that of one form of lymphomatosis.—J. W. Beard. (Biological Abstracts)

SHARPLESS, GEORGE R., and ROBERT LOVE. (Viral and Rickettsial Sect., Res. Div, Amer. Cyanamid Co., Pearl River, New York.)
LYMPHOMATOSIS IN CHICKS IMMUNIZED AGAINST A TRANSPLANTABLE LYMPHOMA. *Poultry Sci. 34(5)*: 1111-1113. 1955.—Over a period of 15 to 20 months, the incidence of lymphomatosis in chickens was not significantly affected by immunization against transplantable RPL-12 lymphoma through inoculation with tumor and subsequent infection with St. Louis encephalitis virus.—R. Love. (Biological Abstracts)

TAYLOR, LEWIS W., DOROTHY C. LOWRY, and LIVIO G. RAGGI. (U. California, Berkeley.)
EFFECTS OF AN OUTBREAK OF AVIAN ENCEPHALOMYELITIS (EPIDEMIC TREMOR) IN A BREEDING FLOCK. *Poultry Sci. 34(5)*: 1036-1045. Illus. 1955.—Following an outbreak of AE over 75% of the hens decreased in rate of lay or paused for a short period (average 5.9 days). Recovery to normal rate followed rapidly. Eggs produced just before and during the period of depressed production showed decreased hatchability and increased embryonic mortality at 19-21 days of incubation. AE virus was recovered from chicks hatched. Infection occurred only in eggs produced preceding or during decline in egg production. In recovery period of egg production, hatchability and chick viability returned to normal levels. Heritability of resistance to AE was approximately .10 or less. General factors of overall fitness were involved rather than specific resistance to AE virus.—L. W. Taylor. (Biological Abstracts)

POULTRY PRODUCTS AND MARKETING

BERGQUIST, DWIGHT H., and FRANK WELLS.
THE MONOMOLECULAR SURFACE FILM METHOD FOR DETERMINING SMALL QUANTITIES OF YOLK OF FAT IN EGG ALBUMIN. *Food Technol.* 10(1): 48-50. 1956.—A micro method for quantitatively measuring small amounts of fat in skim milk was modified to determine fat (or yolk) content of egg albumen. This method measures the fat extracted from the sample using a combination of ethyl alcohol and ethyl and petroleum ethers, by determining the area of its monolayer on a specially prepared acid solution surface. The spreading coefficient of egg oil was found to be 0.98μ g per square inch. Recovery of egg oil from samples to which known amounts of yolk were added was good even after holding samples for extended periods at both 35°F and -10°F.—Authors. (Biological Abstracts)

EREMEEV, G. P. 1956. [Kirov Agric. Inst., Omsk.] Ususka jaic s razlicnym soderzaniem karotinoidov pri inkubacii i hranenii.
DRYING OF EGGS WITH DIFFERENT CAROTENE CONTENTS DURING INCUBATION AND STORAGE. *Pticevodstvo,* 6(2): 39-40.—Eggs of Leghorn hens at the same farm and under the same management were grouped (by candling) as having dark or light yolks; eggs with intermediate yolks were discarded. Hatchability was 73.2 and 65.2% resp. in the 2 groups. Eggs with darker yolks lost less weight during storage for 5 mths. than did eggs with lighter coloured yolks. Carotene content was related to shell thickness and to yolk colour. (Animal Breeding Absracts)

IACONO, P. P., C. O. BALL, and E. F. STIER. (Rutgers U., New Brunswick, N. J.)
A CORRELATION BETWEEN THE HEAT PENETRATION AND THE RATE OF BACTERIAL GROWTH DURING THE ROASTING OF TURKEYS. *Food Technol.* 10(3): 159-161. 1956.—Turkeys were roasted from both the frozen and thawed states. Using a thermal death curve, heat penetration, data, and the growth rates of *Salmonella aertrycke* and *Staphylococcus aureus* as determined in other media, calculations were made to determine when in the roasting process 100% sterilization of the meat was effected. Initial bacterial counts on the turkeys were considered large enough that, upon activation, they could reach toxic proportions. There is no apparent danger of food poisoning due to *Salmonella* when unstuffed turkeys are roasted from the frozen state under the conditions specified in this study. (Biological Abstracts)

KALOYEREAS, SOCRATES A. (Louisiana State U., Baton Rouge.)
NEW TEST FOR THERMOSTABILIZED EGGS. *Food Technol.* 10(3): 162-163. 1956.—Two simple tests for thermostabilized eggs are reported. One test is based on measuring the alcohol number of the white; the other consists of determining the stability of the thermostabilized sample in a constant temperature water bath at 60°C.—Author. (Biological Abstracts)

KLOSE, A. A., and M. F. POOL. (Western Utilization Res. Branch, Agric. Res. Serv., U. S. Dept. Agric., Albany 10, Calif.)
EFFECT OF FREEZING CONDITIONS ON APPEARANCE OF FROZEN TURKEYS. *Food Technol. 10(1):* 34-38. 1956.—Packaged, ready-to-cook, 140°F-scalded, Broad Breasted Bronze tom turkeys, of 2 ages (13-14 weeks and 6 months) were frozen in a blast tunnel under experimental conditions varying with respect to prechilling, blast-air temperature and velocity, and presence of insulative boxing. Measurements were made of rates of temperature change in the skin, under the skin, and in the flesh. Corresponding observations were made of the frozen appearance. For equivalent degrees of finish (amount of fat in skin layer) faster rates of freezing yielded lighter frozen appearance.

On a comparative basis within the commercial ranges studied, optimum appearance was most critically affected by degree of finish and by freezing in a box versus the open-air blast. No appreciable differences in frozen appearance were observed between ice-chilled turkeys and those frozen immediately from the warm eviscerated state. From author abstract. (Biological Abstracts)

KLOSOWICZ, W. 1954. [Czechnica Poultry Exp. Sta.] Porowanie wartosci rzeznej regionalnych odmian gesi krajowch.
COMPARISON OF THE CARCASS VALUES OF REGIONAL VARIETIES OF POLISH GEESE. *Roczn. Nauk rol., B,* 68: 489-512. [Russian and English summaries.]—Investigations on the fattening of 7 regional varieties of geese (all hatched in 1950) were undertaken in the autumn of 1950 at Czechnica Poultry Experimental Station. The varieties were the Pulawy, Kujawy, Gdansk Pomeranian, Kielce, Bydgoszcz heavy-type Pomeranian, Suwalki, and Wroclaw Pomeranian. The Kujawy and the light-weight Kielce geese, which reach sexual maturtiy earlier than the other varieties, were in breeding condition during the fattening period and so did not make such big gains in weight as might have been expected. The late-maturing Suwalki and Gdansk Pomeranian geese showed the best food utilisation and the highest weight increases. The av. weight increase per goose (both sexes) during the autumn fattening period was 1760 g. for the Suwalki, 1265 g. for the Gdansk Pomeranian, 989 g. for the Bydoszcz Pomeranian, 666 g. for the Pulawy, 572 g. for the Kielce, 552 g. for the Kukawy, and 433 g. for the Wroclaw Pomeranian. Data on the carcass composition of all 7 breeds are presented in tabular form, as well as the results of more detailed analyses of the Gdansk Pomeranian, Suwalki, Bydgoszcz Pomeranian, Kujawy and Kielce. It is suggested that the early-maturing varieties should be fattened early on green feed, or immediately after summer grazing, and that the late-maturing varieties should be fattened in autumn and winter. In all the varieties the proportions of edible parts were similar, the absolute quantity depending on the size of the carcass. (Animal Breeding Abstracts)

KLOSOWICZ, W. 1955. [Zootech. Inst., Cracow.] Ocena wartosci rzeznej indorow rasy Bronze pochodzacych z krajowych ferm hodowlanych.
ESTIMATION OF THE SLAUGHTER VALUE OF BRONZE TURKEY TOMS FROM POLISH BREEDING FARMS. *Roczn. Nauk rol., B,* 69: 241-257. [Russian and English summaries.] 333—A comparative study was made of the carcass characters of 6-mth-old-Bronze toms of 3 main types: the progeny of imported, English-bred turkeys raised on various Polish farms, the progeny of imported ♂♂ mated with Polish-bred ♀♀, and the progeny of Polish-bred parents. Detailed results are tabulated. Differences in carcass quality were found between the progeny of the 1st group but, in general, they were greatly superior to the birds in the other 2 groups. The progeny of imported toms and Polish-bred hens had a very low market value. (Animal Breeding Abstracts)

KRAFT, A. A., and **A. W. BRANT.** (U. S. Dept. Agric., Beltsville, Md.)
THE INFLUENCE OF ENVIRONMENT ON LYSOZYME ACTIVITY IN SHELL EGGS. *Food Technol. 10(1)*: 45-47. 1956.—Lysozyme activity of shell eggs appeared to increase early during storage at 25°C and then declined during the remainder of the 21-day storage period. The decrease in activity amounted to about 16%. Differences in activity were not as pronounced at 1.5° or 10° as they were at 25°C. Incidence of bacterial infection of shell eggs was independent of lysozyme activity and the pH of the albumen. *Pseudomonas* bacteria responsible for green fluorescence in shell eggs were not lysed by lysozyme or by egg albumen. The pH of the albumen did not affect percentage of shell eggs infected during storage at 1.5°, 10°, or 25°C.—Authors. (Biological Abstracts)

LARIONOV, V. F., and PANKRATJEV, G. V. 1955. Russkie podsadnye utki.

THE RUSSIAN GAME DUCK. *Pticevodstvo*, 5 (4): 14-18.—Only a few small flocks of this breed are kept. They have been studied at the Zoological Station of Moscow University and some material was collected from the state farm of the Bratcev Hatchery. Live weight, and measurements of the body and parts of the carcass of the Russian Game are given and compared with those of the Pekin duck and wild mallard. In the majority of the characters studied the Russian Game was intermediate between the other two. The meat is of good quality and the ratio meat : bone is slightly higher than in the Pekin. (Animal Breeding Abstracts)

MARGOLF, P. H., E. W. CALLENBACH, R. C. MILLER, J. E. NICHOLAS, J. S. PERRY, J. F. CONE, J. F. MURPHY, M. L. DODDS, and GRACE BENNETT. (Pennsylvania State U., University Park.)

THE EFFECT OF TYPE OF SCALD AND WRAP ON THE MARKET QUALITY OF FROZEN POULTRY. *Poultry Sci. 35(1)*: 37-46. Illus. 1956.—The effects of semi- and full-scalding, and 3 wrapping treatments were studied on 210 chicken carcasses. At each weighing time during a 72-week storage period carcasses from each scalding, wrapping, and storage treatment were used for bacteriological and biochemical analysis and for palatability tests. Weight losses were greatest for carcasses wrapped with cellophane. Full-scalding was a satisfactory practice when stored carcasses were wrapped with polyethylene or pliofilm. Wrapping material, scald treatment and length of storage had no effect on palatability. Bacterial counts of skin and meat showed low initial and actual decreases as storage progressed. Peroxide values of raw abdominal cavity and subcutaneous fatty tissue and cooked fat increased progressively and consistently during storage, but did not indicate any marked deterioration of the fat even at the end of 72 weeks. —From auth. summ. (Biological Abstracts)

MORRISON, MARY A. (U. Washington, Seattle), **W. J. STADELMAN, and J. G. DARROCH.** (State Coll. Washington, Pullman.)

EGG QUALITY ON THE SEATTLE MARKET. *Poultry Sci.* 34(6): 1380-1285. 1955.—The average quality of 1055 dozen of eggs purchased as grade A or grade AA on the Seattle, Washington, market during 3 seasons was 65.5 Haugh units. No significant differences were found to exist in egg quality due to brands. There was no difference in variability of quality between brands, but summer eggs had greater variation in quality than either fall or spring eggs. There was a significant interaction between brands and seasons with respect to egg quality.—W. J. Stadelman. (Biological Abstracts)

ORR, H. L. (Ontario Agric. Coll., Guelph, Canada.)

EFFECT OF STRAIN, SEX AND DIET ON DRESSING PERCENTAGE AND ON COOKED MEAT YIELD OF 10 WEEK OLD BROILERS. *Poultry Sci. 34(5)*: 1093-1097. 1955.—A comparison of the percentage of chilled dressed weight taken of live weight, using 10 strains and crosses of broilers, gave no significant differences due to any of these factors. On the basis of ready-to-cook weight as a percentage of live weight, the effect of strain and sex was significant, with White Cornish giving the highest yield. Yield of edible cooked meat differed significantly among strains when taken on live and chilled dressed weights only. Sex and diet had no significant effect on yield of cooked edible meat. In general, the broad breasted strains had less finish than non-broad breasted.—H. L. Orr. (Biological Abstracts)

PIPPEN, ELDON L., and A. A. KLOSE. (Agric. Res. Serv., U. S. Dept. Agric., Albany 10, Calif.)

EFFECTS OF ICE WATER CHILLING ON FLAVOR OF CHICKEN. *Poultry Sci. 34(5)*: 1139-1146. 1955.—Loss of flavor in resulting

broth was seen when whole, ready-to-cook carcasses were immersed in ice water for as little as 3 hours. Half and whole carcasses immersed for 3 hours in ice water, and subsequently roasted, did not differ significantly in flavor from air-chilled counterparts. When immersion time in ice water was increased to 18 hours, a flavor loss in the roasted product was noted. There was no detectable loss of flavor, in subsequently fried chicken, when whole carcasses were chilled in ice water for 20 hours. It was determined that flavor loss resulting from ice water chilling was caused by extraction of water-soluble components. Flavor of the extract was associated with its mineral content, which contributed primarily a salty taste. It was concluded that prolonged holding of chicken in cold water is deleterious to maintenance of optimum flavor and should be avoided. On the other hand, results indicate that ice-slush chilling of whole, ready-to-cook chicken carcasses, as normally practiced in industry, does not result in detectable flavor loss in the fried or roasted product.—E. L. Pippen. (Biological Abstracts)

ROLFES, THOMAS, PATRICIA CLEMENTS, and A. R. WINTER.
THE PHYSICAL AND FUNCTIONAL PROPERTIES OF LYOPHILIZED WHOLE EGG, YOLK AND WHITE. *Food Technol. 9(11)*: 569-572. 1955.—Lyophilization of egg albumen had no detrimental effect on its functional properties as measured by angel cake vol. Lyophilization of yolk impaired its emulsifying properties as measured by mayonnaise stability. The impairment was less in yolk diluted with water before freezing. Lyophilization of whole egg impaired its functional properties as measured by sponge cake vol.—Authors. (Biological Abstracts)

SPENCER, J. V. (State Coll. Washington, Pullman), **W. E. MATSON, W. J. STADELMAN, and M. C. AHRENS.**
THE EFFECT OF COOLING AND FREEZING PROCEDURES ON CONSUMER ACCEPTABILITY FACTORS OF TURKEY MEAT. *Food Technol. 10(1)*: 16-18. 1956.—The effects of 5 cooling treatments and 3 freezing temperatures on consumer acceptability factors for turkeys were checked. Turkeys cooled in ice water had a better appearance, gave a net gain in weight during cooling and freezing, but lost the most weight during thawing and cooking.—J. V. Spencer. (Biological Abstracts)

WILCOX, F. H., Jr. (Cornell U., Ithaca, N. Y.)
EVIDENCE FOR AN ASSOCIATION BETWEEN THE LYSOZYME LEVEL AND THE QUALITY OF EGG WHITE. *Poultry Sci.* 34(5): 1170-1172. 1955.—Lysozyme concentration, pH, and Haugh units were measured using egg whites of hens from several sources. Statistical analysis of data on fresh eggs revealed in every case a significant regression of egg white quality on lysozyme concentration. Multiple regression analysis of data on pairs of eggs of which one was fresh and the other was stored for 3 days at 35°C yielded inconclusive results; although there were indications that the relationship between the decrease in lysozyme concentration and egg white quality upon storage is not a direct one.—F. H. Wilcox, Jr. (Biological Abstracts)

YAO, ALDEN, A. I. NELSON, and M. P. STEINBERG. (U. Illinois, Urbana.)
FACTORS AFFECTING THE RATE OF CHICKEN MEAT DEHYDRATION UNDER VACUUM. *Food Technol. 10(3)*: 145-150. 1956.—Serving size pieces of chicken muscle were dehydrated in a vacuum plate drier. Factors studied included drier plate temperature, pressure, initial product temperature and moisture, sample thickness, precooking, and type of muscle. Final product quality was evaluated by means of organoleptic tests and rehydration rations. Freeze drying was used for comparison. Vacuum dehydration required one fourth the drying time without apparent impairment of initial product quality.—M. P. Stenberg. (Biological Abstracts)

ZIEGLER, FRANK, and W. J. STADELMAN. (State Coll. Washington, Pullman.)
INCREASING SHELF-LIFE OF FRESH CHICKEN MEAT BY USING CHLORINATION. *Poultry Sci. 34(6):* 1389-1391. 1955.—Ninety-six chicken fryers were used to check the effect of chlorine in the cooling water or in rinse water on shelf-life when held at 34°F. All birds were split into halves so that paired comparisons between halves of the same chicken could be used for control and treated groups. It was found that chlorine used in the cooling water significantly increased shelf-life as determined by off-odor or appearance of slime. Chlorine concentrations at the start of the cooling period of 2 hours were 10 or 20 ppm. Use of chlorine cooling water had a considerably greater effect on shelf-life of birds processed at 128°F than on those processed at 140°F.—From author abstract. (Biological Abstracts)

MANAGEMENT

BYHOVEC, A. U. 1955. [Ukranian Poult. Breed. Res. Sta.] Opyty ohlazdenija inkubiruemyh gusinyh jaic neposredstvenno v inkubatore.
THE COOLING OF INCUBATING GOOSE EGGS IN THE INCUBATOR. *Pticevodstvo,* 5(3): 24-27.—When goose eggs were cooled twice daily from the 16th day of incubation by removal from the incubator, hatchability was 69.2% of the eggs set. The hatchability of eggs transferred to a second incubator on the 15th day of incubation, when both incubators were ventilated but the eggs were not cooled, was 44%. The percentage was 11.8 higher when the eggs were not transferred but were cooled twice daily from the 24th day. When the trays were moved from the top to the foot of the incubator on the 16th day hatchability was 62.3%, but when they were moved from the foot to the top it was 44.7%. There was no appreciable difference in the hatchability of eggs cooled to 30° twice daily from the 16th or from the 21st day; it was lower when the eggs were cooled from the 24th or 26th day. (Animal Breeding Abstracts)

CAUQUELIN, YVES and M. LAFON.
LE POUSSIN O'UN JOUR ET LA PRODUCTION DU POULET DE TABLE. (The one-day-old chick and table chicken production.) Zootechnia V:31-47. Jan.-Feb. 1956.—The growing poultry industry in France is discussed. Such phases as the production of day-old chicks, and table poultry, are presented with information concerning breeding, feeding, pathology and management. The financial and marketing phases are also discussed. The conclusions presented are that poultry raising in France is in a particularly active stage of organization and entering an era of prosperity.

COLES, R. 1954. [Minist. Agric. Fish., London.]
CHANGES IN THE PATTERN OF POULTRY KEEPING. *J. R. agric., Soc. Engl.,* 115: 69-82.—The pattern of poultry keeping for egg production in Britain is changing. There is a rapidly quickening change to intensive methods and, to-day, probably more than 1/3 of the poultry population on agricultural holdings is housed intensively—in batteries, deep litter and strawyards. The change is occurring with even greater celerity with table poultry production. The change in pattern is already exerting a decided influence on the seasonality of egg production. The economic factors leading to these changes and the economic consequences are discussed. Some comparison is made between the incidence of production and prices realised in the U.S.A. and in this country. The problems relating to disease control and husbandry which are likely to arise are indicated.—Author's summary. (Animal Breeding Abstracts)

GERRIETS, E. and BOBSIEN, R. Vergleichende Kükenaufzuchtversuche nach veterinärhygienischen Gesichtspunkten und Aufzuchtversuche unter Verwendung der Altstreuverfahren. 2.
COMPARATIVE TRIALS IN CHICK REARING FROM THE

POINT OF VIEW OF VETERINARY HYGIENE AND EXPERIMENTS IN REARING ON DEEP LITTER. 2. *Berl. Münch. tierärztl. Wochenschr.*, 1955, 68, 372-375. [Abt. Geflügelkrank., Humboldt Univ., Berlin.] English summary.—The 1953 experiment was repeated in 1954. There were again 4 groups each of 100 Leghorn day-old chicks on sawdust, sawdust with under-floor heating, deep hen litter alternated with garden compost, or horse litter with garden compost. This time the groups on deep litter did better than those on sawdust, but since under-floor heating gave an improvement in both years it was thought that the good effect of deep litter was largely that of a warm floor.

Another experiment was made with 4 groups, each of 20 chicks, from 4 groups each of 10 pullets from the 1953 experiment, kept in the same way over the winter, whose laying performance is to be reported elsewhere (Gerriets and Werner, *Arch. Geflügelzucht*, 1955, in the press). The results were similar to the above, except that there was less difference between the groups on sawdust on a heated floor and deep hen litter, possibly owing to some acclimatisation effect.

The results of all 3 experiments are tabulated together. The mean increase in weight gain with horse litter over the 3 experiments was as much as 11.5 per cent., which is of the order of that produced by including antibiotics in the feed. The birds on deep litter remained healthy, but the practice involves risks and it is considered that veterinary experts should be consulted when new deep litter houses are constructed or old buildings adapted.—W. M. Deans. (Nutrition Abstracts and Reviews)

KOVTUN, N. F. 1955. Opyt povyseniia vyvodimosti gusinyh jaic na Boljse-Tokmakskoi IPS.

INCREASING THE HATCHABILITY OF GOOSE EGGS AT THE BOLSHE-TOKMAKSK HATCHERY. *Ptitsevodstvo*, 5(2): 25-26. —In 1953, of 6182 goose eggs set, all but 220 were subjected to an experimental regime of incubation. All the eggs were incubated in a Record-39 incubator until the 16th day, when they were transferred to a FEM-20. The experimental eggs were taken out twice daily, turned 180° and cooled to 30°. The control eggs were not turned 180° and were cooled only from the 16th day. Hatchability was 59.3 and 21.8% resp. (Animal Breeding Abstracts)

OLLIVERI PETIVA, C. Influenza della lettiera permanente su l'accrescimento e la mortalità dei pulcini.

THE EFFECT OF DEEP LITTER ON THE GROWTH AND MORTALITY OF CHICKENS. *Ann. Sper. agrar.*, 1954, 8, 1415-1430. [Ist. Zootec. Casear. Piedmont, Turin.] English summary.—Four groups of White Leghorn chickens were reared on deep litter. For 2 groups the litter was renewed every week. One group in each pair had a ration containing fish and meatmeal, and the other skimmed milk powder. The permanent litter was better for growth, particularly in the group getting skimmed milk, but mortality was higher on the permanent than on the renewed litter.—T. D. Bell. (Nutrition Abstracts and Reviews)

PLATT, CLARENCE S. (Rutgers U., New Brunswick, N. J.)

A STUDY OF THE EFFECT OF RESTRICTED LIGHTING ON JANUARY HATCHED PULLETS. *Poultry Sci. 34(5)*: 1045-1047. 1955.—White Leghorn pullets hatched January 28 were reared when 13 weeks old under a restricted lighting schedule: 8 hours of artificial light and 16 hours of darkness daily. At 30 weeks old the light was advanced to 14 hours daily. A 2d group of birds was maintained under normal daylight with additional artificial light provided at the age of 35 weeks to give them 14 hours of light daily. During the period when light was restricted to 8 hours feed consumption and egg production were retarded, as compared with the control group. When exposed to 14 hours of light, egg production of the group previously restricted to 8 hours of light increased to a level in excess of the control group,

even when the latter also received 14 hours of light—89.4 and 72.7% respectively. Egg weight and body weight were the same in both groups at the age of 40 weeks.—C. S. Platt. (Biological Abstracts)

RAINFORD, A. J. 1955.
THE HATCHING SEASON. *Poult. Ind.*, 20: 254.—In the 1955 season of the Poultry Production and Progeny Trials in the U.K. hatchability of all eggs set was 71.24%; the figures for heavy and light breeds were 70.86 and 72.13% resp. Hatchability of fertile eggs set was 84.40 for heavy breeds *v.* 84.14 for light breeds. Data relating to 8 breeds are tabulated. [For the 1954 results see *A. B. A.*, 22, No. 1177.] (Animal Breeding Abstracts)

SIEGEL, P. B., and C. D. MUELLER. (Kansas State Coll., Manhattan.)
THE EFFECT OF LOW TEMPERATURE EXPOSURE ON INBRED, OUTBRED AND CROSSBRED CHICKS. *Poultry Sci. 34(6)*: 1445-1446. 1955.—Exposure of chicks to low temperature at 1 day and 2 weeks of age had little effect on growth and feed consumption. Inbreds had a lower relative resistance to exposure than either outbreds or crossbreds.—P. B. Siegel. (Biological Abstracts)

VACZY, J. A. 1955. A keltetési eredmények javítása csirakorong vizsgalattal.
IMPROVING THE HATCHING RESULTS BY THE EXAMINATION OF THE GERMINAL DISC. *Baromfiipar*, 1955 (1/2): 15-17. From abstract in *Hung. agric. Rev.*, 1955, 4(2): 16.—A method is described by which eggs are set in special incubators at 39° -39.5° C. for 24 hrs., after which they are candled at room temperature and eggs not showing a germinal disc are discarded. (Animal Breeding Abstracts)

WEBER, F. and LE ROY, H. L. Wechselwirkungen zwischen Erbgut und Umwelt beim Haushuhn und ihre Bedeutung für die Umweltgestaltung bei Leistungsprüfungen.
INTERACTIONS OF HEREDITY AND ENVIRONMENT IN THE DOMESTIC FOWL AND THEIR BEARING ON THE CONTROL OF ENVIRONMENT IN TESTS OF PRODUCTION. *Arch-Geflügelk.*, 1956, 20, 1-14. [Versuchsgut Chamau, Eidg. Tech. Hochsh., Zurich.] English summary.—Although the possibility of interactions of heredity and environment is generally admitted, their existence has been demonstrated in only very few studies on domestic animals.

In the present paper hens in an egg-laying test made at the experimental farm of Chamau in 1954-55 and reported elsewhere (Weber, *Der Geflügelhof*, 14 October 1955) were compared with their full sisters in the flocks from which they came, for number of eggs from onset of laying to 9 January, egg weight in December, and body-weight at 10 weeks of age. From each of 4 flocks 70 unsexed chicks selected at random were sent for test. Owing to deaths, failure to lay, missing heredity data and exclusion of hens which had not at least 3 full sisters for comparison, correlations were worked out only for 22, 25 and 25 hens from 3 flocks. These were compared with theoretical correlations calculated from the heritabilities of the 3 characteristics as found from all the available data for each flock separately. From the differences found it was concluded that interaction of heredity and environment probably exists for weight at 10 weeks considered as a measure of early maturity, in agreement with the results of Skaller and Sheldon (*Austral. J. Agric.* Res., 1955, 6, 171) is not probable for number of eggs, and requires further investigation for egg weight. The results show the importance of conducting tests in an environment similar to that in which the birds or their descendants are likely to be kept.—W. M. Deans. (Nutrition Abstracts and Reviews)

GENERAL

ANDERSON, C. F., A. A. McARDLE, and M. D. JONES. 1955. [Parafield Poult. Sta.]
RESULTS OF THE FIRST EGG TO LAYER TEST HELD AT PARAFIELD POULTRY EXPERIMENT STATION. *J. Dep. Agric. S. Aust.*, 58: 461-464.—The first test was held during 1953-55 and entries were divided into 3 classes; 17 entries were received for light breeds, 9 for heavy breeds and 7 from hatcheries. Each competitor had to submit 60 eggs weighing not less than 2 oz. each and drawn at random from a minimum of 100 mated purebred birds. Average hatchability of all eggs set was 70.2% (35-90), and av. number of day-old pullets was 20.6 per 60 eggs set. Of all birds entering the rearing pens 81% were reared. During the 50-wk. laying period from 1st April av. production of hen-housed birds was 185.6 eggs (121.1-223.1) weighing 2.04 oz. Egg production of all entries during the winter period up to 31st July represented 50% of the total. (Animal Breeding Abstracts)

BOBBY, F. C. 1955. [Dep. Agric., Wellington.]
POULTRY FLOCK IMPROVEMENT PLAN: DATA ON AVERAGE EGG PRODUCTION AND POULTRY LOSSES. *N. Z. J. Agric.*, 90: 271-272.—In 1954, the period of egg recording required of participating flocks was reduced from 10 to 8 mths. and ran from 1st March to 31st Oct. Twenty-seven flocks completed the egg recording period; of these, 10 White Leghorn and 9 Australorp flocks were in the North Island, and 6 W.L. and 2 Australorp flocks in the South Island. The W.L.'s averaged 120.0 eggs per pullet and the Australorps 134.1 eggs. Ten W.L. and 4 Australorp flocks attained a flock-housed average equal to, or greater than, the Dominion average. Total wastage accounted for 12.7% of the W.L.s and 8.9% of Australorps. (Animal Breeding Abstracts)

COOPER, D. M. 1955. [Poult. Res. Sta., Anim. Health Trust., Houghton. Hunts.]
A NOTE ON A COLLECTION APPARATUS FOR AVIAN SEMEN. *Vet. Rec.*, 67: 331-332.—The apparatus, which can be used in either the one- or two-man method of collecting avian semen, is illustrated by a diagram and photographs. It is so constructed as to prevent contamination of the semen with foreign matter. It allows the last drop of semen to be collected, and automatically measures the total ejaculate. A syringe for inseminating the hens fits easily into the centrifuge tube, and there is thus no loss. (Animal Breeding Abstracts)

COOPER, G. H., and DE SATGE, A. P. 1955.
FINAL REPORT ON THE THIRTY-FIFTH ANNUAL SOUTHERN RHODESIA EGG-LAYING TEST HELD AT GWEBI COLLEGE OF AGRICULTURE: 48 WEEKS: MARCH 1st, 1954, TO JANUARY 30th, 1955. *Rhod. agric. J.*, 52: 180-183.—Over the test period of 48 wks. total egg production on a survival basis averaged 216 eggs per bird, and on a hen-housed average 203. In the section for Heavy Breeds a team of New Hampshires won with an average of 233.8 eggs per bird. A team of Black Leghorns (the only one) was 1st in the Light Breeds Section with an average of 253 eggs per bird. The mortality rate of 6% was well below the average of other years. (Animal Breeding Abstracts)

DAVIDSON, J. A., W. N. FISCHER, H C. ZINDEL, and C. M. McCRARY. (Michigan Agric. Expt. Sta., East Lansing.)
MICHIGAN BROILER TEST NO. I, SUMMER 1955. Michigan State Univ. Agric. Expt. Sta. Quart. Bull. 38(2) 210-215. 1955.—Samples (104) of chicks from 22 breeding groups were compared under similar environmental conditions for growth, death loss and slaughtering data. Males averaged 3.19 lbs. and females 2.55 lbs. at 10 weeks. Ready-to-cook weights were 67.95% and 68.2% of live weights for

males and females respectively. The range in average live weights was 2.85 lbs. to 3.62 lbs. for males and from 2.30 to 2.83 lbs. for females. Feed required to produce a pound of weight varied from 2.66 lbs. to 3.27 lbs. Mortality ranged from zero percent to 4.8% with the average for all groups 2.47%. Carcass grades were determined on a scale of 1 to 5 using federal grades as a basis for scoring giving the breeder an opportunity to learn the weak and strong points of his stock.—Authors. (Biological Abstracts)

DE BEER, J. A. 1954. [Coll. Agric., Glen, O. F. S.]
CENTRAL EGG-LAYING TEST. TWENTY-SEVENTH OPEN TEST AND NINETEENTH TEST OF THE REGISTERED BREEDERS ASSOCIATION. *Fmg S. Afr.*, 29: 576-578.—The best hen in the Open Competition (378 entries) was a Black Australorp with 300 "A" eggs, as was also the winner of the Breeders' Register Test (416 entries) with 296 "A" eggs. (Animal Breeding Abstracts)

FEDELI-AVANZI, C. 1953. [1st. Zoocolt., Univ. Pisa.] Della influenza dei fattori climatologici sulla produttività delle galline ovariole.
THE EFFECT OF CLIMATOLOGICAL FACTORS ON THE PRODUCTION OF LAYING BIRDS. *Ann. Fac. Agr. Pisa*, N.S., 14: 179-199.—The effect of temperature, wind velocity, rainfall and barometric pressure on egg production in some 600 White Leghorns was investigated during 4 consecutive yrs. The results are represented graphically. Although it was difficult to distinguish between the effects of the different factors studied, it was concluded that extremes of temperature, heavy rainfall and, to a lesser extent, high winds have a depressing effect on egg production. (Animal Breeding Abstracts)

HENDERSON, EARL W. (Michigan State U., East Lansing.)
WHICH CHICKS HATCH FIRST—MALE OR FEMALE? Michigan State Univ. Agric. Expt. Sta. Quart. Bull. 38(3): 362-264. 1956.—The ratio of sexes of 269 chicks pedigree hatched during 4 successive 6-hour emergent periods was recorded. Contrary to popular beliefs, there was a slight preponderance of females in the first emergent period. Only 1 of the ratios approached significance, i.e., a slight preponderance of males in the fourth emergent period (X^2 3.8).—E. W. Henderson. (Biological Abstracts)

JAEGER,—. 1955. Die erste Legeleistungsprüfung in der DDR 1953 bis 1954 im Landesinstitut für Kleintierzucht "Merbitz", Nauendorf (Saalkr.)
THE FIRST EGG LAYING TRIAL IN THE GERMAN DEMOCRATIC REPUBLIC, 1953 TO 1954, IN THE INSTITUTE OF SMALL ANIMAL BREEDING "MERBITZ," NAUENDORF (SAALKR.) *Tierzucht*, 9: 130-133.—In the 1st laying trial, which lasted from 1st Nov. 1953 to 15th Sep. 1954, 47 pens were entered, only 3 of which were eliminated before the completion of the trial. There were 24 pens of White Leghorns, 19 of Brown Leghorns, 2 of Autosexing Leghorns and 2 of R.I.R.s, each of which contained 10 birds. Total mortality was 10.8%. In the winter-laying part of the experiment up to the end of Feb., of the 18 pens which were given extra marks, only 4 were Brown Leghorns, while the rest were White Leghorns. Over the whole trial, 1st place was taken by a pen of Brown Leghorns, laying an average of 215.5 eggs per hen with an av. weight of 53.1 g. Second place was taken by a pen of White Leghorns, with an average of 205.8 eggs per hen and an av. egg weight of 60.2 g. The next 8 places were also taken by White Leghorns. In future, trials will be held in 4 centres to avoid too great changes in climate for the birds. (Animal Breeding Abstracts)

KARABAN, I. A. 1955. [Molotov Collective Farm, Moscow Province.] Moskovskie kury v kolhoze.
MOSCOW FOWLS AT A COLLECTIVE FARM. *Pticevodstvo*, 5 (7): 25-26.—Fowls of the Moscow breed group have been bred for the last 3 yrs. at the Molotov Farm in the Khimkin district. In 9 mths. of

1954 they laid an average of 108.7 eggs *v.* 96.6 for White Leghorns. The pullets came into production at 165-180 days. Winter production of the Moscow fowls is high, their meat is of better quality than that of the W.L.s and their live weight greater. (Animal Breeding Abstracts)

NORTHERN IRELAND: MINISTRY OF AGRICULTURE. 1955. REPORT ON EGG LAYING TESTS, PROGENY TESTING AND COCKEREL TESTING, 1951-52 AND 1952-53. *Res. exp. Rec. Minist. Agric. N. Ire.*, 1952-53, 3: 269-273.—The 30th and 31st Laying Tests at Stormont are reported. The progeny testing of cockerels again formed part of each test. In 1951-52 there were 17 entries each of 12 pullets and in 1952-53 there were 22 entries. In 1951-52, 9 cockerels and in 1952-53 another 12 were proven, their daughters having an average of at least 180 scoring eggs. In addition the Cockerel Testing Station tested 21 and 28 birds resp. in the 2 yrs. The hen-housed average for the 2 tests was 180.4 and 184.9 resp. (Animal Breeding Abstracts)

WOOD-GUSH, D. G. M. 1955. [Poult. Res. Centre, Edinburgh.] THE BEHAVIOUR OF THE DOMESTIC CHICKEN: A REVIEW OF THE LITERATURE. *Brit. J. Anim. Behav.*, 3: 81-110. [B.]—The subjects covered are: the behaviour of the chick, the sensory perceptions of the adult bird, intelligence and memory, the "language" of the chicken, feeding habits, the peck-order, mating behaviour, nesting behaviour and brooding behaviour. The bibliography contains 143 titles. (Animal Breeding Abstracts)

ZEBENKA, R. P. 1953. Rabota nad soversenstvovaniem i sozdaniem novyh porod seljskohozjaistvennyh zivotnyh v Litovskoi SSR. IMPROVEMENT, AND DEVELOPMENT OF NEW BREEDS OF LIVESTOCK IN THE LITHUANIAN S.S.R. *Naucnaja Sessija po Voprosam Biologii i Seljskogo Hozjaistva, Riga*, 22-26 *oktabrja* 1951 *g. Moscow: Academy of Sciences of U.S.S.R.* Pp. 377-384.—Various breeds of livestock are mentioned and their defects indicated. Poultry breeding plays a large role in the Republic and the Lithuanian goose has been developed. There are 2 types the Vishtines and the Puljkines. Production and growth of these 2 types are compared with those of the Kholmogor and Toulouse breeds. The av. live weight, egg production and egg weight of the Vishtines goose exceed the averages for the Kholmogor breed; egg production is higher, but live weight and egg weight are less than those of the Toulouse goose. The yield of the carcass components was greater for the Vishtines than for the Kholmogor goose. (Animal Breeding Abstracts)

NOTICE OF CHANGE OF ADDRESS

All communications for the Secretary of the World's Poultry Science Association should be directed to:

Major Ian MacDougall,
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NOTICES TO MEMBERS OF THE ASSOCIATION

ELEVENTH WORLD'S POULTRY CONGRESS.

Members will recollect that at the Triennial meeting held in Edinburgh in August, 1954, on the occasion of the Tenth World's Poultry Congress, it was reported that the Council had decided that the following countries should be approached, in the order indicated, with a view to obtaining an invitation for the holding of the Eleventh World's Poultry Congress in 1957: Belgium, Sweden and Canada.

The Belgian Government were prepared to accept our invitation provided the Congress was held in 1958, in which year an International Exhibition was being arranged by them. After consultation with the President and in view of the specific requirement of the Association's Constitution (Article XII(1)) that "Worlds Poultry Congresses shall be held every three years," it was decided, with regret, that the invitation for 1958 could not be accepted. The Swedish Government were then approached and they expressed their regret that they were unable to accept the invitation. By this time, a considerable amount of time had elapsed. It must be appreciated that when making arrangements for the issue of these invitations, Embassies, Foreign Offices, Ministries of Agriculture and Poultry Organisations have all got to be brought into consultation and these consultations take up a considerable amount of time. The Canadian Government was then invited but "after full discussions at Ottawa they came to the conclusion that it did not seem practical to extend an invitation to the Congress to meet in Canada in 1957 as there would not be sufficient time for arrangements to be made." They added, however, that they would be pleased to consider extending an invitation for a meeting in a later year.

Unofficial contacts were then made with Germany, Mexico, the Netherlands, Portugal, Russia and Switzerland but up to 1st August, 1956, no country seemed willing to accept an invitation to hold the Congress. In the case of the Netherlands, they observed that there was not sufficient time in which to stage a Congress successfully. On 7th August, an invitation was received from the Mexican Government to hold the Congress in their country in 1957 but, after consultation with the President, it was decided that it would be impossible to organize a Congress of a calibre equivalent to

those previously held and particularly to ensure a sufficiency of papers of the high standard maintained at earlier Congresses.

In view of the position which had arisen, and after consultation with the President, it was decided to report the position fully to the Council of the Association and to point out to them that the only alternative was to hold the 11th Congress in 1958. They were asked—

(a) to give their approval to that suggestion,
(b) to say whether the Mexican Government should be asked to re-submit their invitation for 1958,
(c) to indicate which three countries should be approached with a view to obtaining an invitation for the 1958 Congress and the order in which they should be approached.

The replies received indicated approval that Mexico should be invited to re-submit their invitation for 1958 and that the following countries should be approached in regard to an invitation for the 11th World's Poultry Congress in the order indicated: Mexico, Belgium and Sweden.

The Mexican Government have re-submitted their invitation for 1958 and it has been accepted. The venue will be Mexico City. The date of the Congress has not yet been agreed, but it is expected to be held between the middle of August and the middle of September.

The decision that the next Congress should be held in 1958 raised the old question of the length of the interval between Congresses. In my circular to the Members of Council, I wrote to them as follows:

"At the time (1939) of the 7th World's Poultry Congress in Cleveland, Ohio, U.S.A. the opinion was freely expressed by many members that Congresses were being held at too short intervals and statements were made by some members that their Governments were objecting to the frequent calls made upon them to meet the expenses of providing a National Exhibit and of meeting the expenses of their delegations at the Congresses. At the time, I discussed the question with several delegates and decided to bring forward a resolution at the Triennial meeting of Council that the interval between Congresses should be extended to four years. I was promised a considerable amount of support for my resolution. When I submitted my resolution to the Triennial meeting, the President ruled that its submission was out of order as I had failed to give the necessary notice, required under the constitution, of my intention to submit the resolution. The President was,

of course, quite correct in so deciding. At that time, I was not quite so familiar with the Constitution of the Association as I am today. Since then, three Congresses have been held and there is a growing volume of opinion that the period between Congresses should be lengthened. That opinion is strengthened by the fact that no country has come forward with an invitation for the 11th Congress.

Some of the reasons given for a lengthening of the period are as follows:

(1) Three years is too short an interval in which to carry out experimental and research work and arrive at definite conclusions.

(2) The present interval is too short in which to obtain invitations and to enable the host and other countries to have ample time in which to plan organisation and participation.

(3) Governments are becoming concerned at the frequent and heavy financial calls involved in organising the participation of their countries at Congresses.

(4) Governments are not coming forward readily to act as hosts of Congresses in view of the ever increasing cost of the work of organisation and administration.

(5) The interval is too short in which the lower salary groups of those engaged in the poultry industries of the various countries can accumulate the necessary finance involved in attending Congresses particularly in view of the ever increasing cost of transport and hotel accommodation.

(6) Many scientific organisations who have hitherto held Congresses at intervals of three years, faced with the same difficulties, have now extended the interval to 4 years.

I propose to submit a resolution in my private capacity as an ordinary member of the Association and not as Secretary, that Article XII (1) should be altered to read: "World's Poultry Congresses will be held every four years." This will necessitate the alteration in the term of office of Presidents, Vice-Presidents and the Secretary and Treasurer from three to four years and the period for which each Member of Council is elected from six to eight years (Article VI(3)). An alteration of from three to four years will be necessary in Section 5 of the same Article and Articles IX(1) and X. If, however, the majority of the Members of Council think the resolution worthy of support, then I am quite prepared to let

it go forward in the name of the Council. The resolution can be made retrospective to 1954 and in this way justify the decision to hold the next Congress in 1958."

The Council decided, practically unanimously, (there was only one dissentient) to support my resolution. Accordingly, it is submitted in the name of the Council.

Ian Macdougall.
Secretary.

NOTICE OF AMENDMENTS TO CONSTITUTION

In terms of Sections 6 and 7 of the Association's By-Laws the Council submits the following resolution:—

That XII(1) be amended to read as follows:

"World's Poultry Congresses shall be held every four years."

That the following amendments, consequent upon the alteration to Article XII(1), be approved:

Article VI(3) That the words "three" and "six" be altered to "four" and "eight" respectively and that the word 'Triennial" be altered to "Regular".

Article VI(4) That the following words be deleted "and such election shall be at the Triennial Meetings".

Article VI(5) That the word "three" be altered to "four". That the following words be deleted "at the Triennial Meetings".

Article IX(1) That the word "three" be altered to "four".

Article X That the word "three" be altered to "four".

That these amendments should be made retrospective to 1954.

I would draw your attention to the By-Laws governing any amendment of the Constitution:

Section 6. The Constitution and By-Laws may be amended at any time by two-thirds vote of the members of the Association voting, representing at least half of the number of countries which have at least 10 members. Such vote to be taken by mail.

Section 7. Any proposed amendment to the Constitution or By-Laws shall be placed in the hands of each member of the Association at least three months prior to the time of voting on the amendment.

Section 8. In all postal votes where a definite majority is specified in either Constitution or By-Laws such majority shall be construed as of those voting.

In the following issue of the World's Poultry Science Journal, a voting paper will be inserted on which you will be asked to record your vote for or against these amendments.

ISSUED ON BEHALF OF THE COUNCIL

Ian Macdougall.

Secretary.

ANNUAL MEETING OF THE GERMAN BRANCH OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

The Annual Meeting and Conference of the German Branch of the World's Poultry Science Association was held on September 9th at the "Bundesforschungsanstalt für Kleintierzucht" in Celle. This date simultaneously offered the opportunity to combine with the participation in the Meeting the visit of the great Annual Exhibition of the "Deutsche Landwirtschaftsgesellschaft" from September 9th—16th at Hannover. Prof. Dr. Havermann, the President of the German Branch welcomed the numerous participators, nearly 80, members and guests from Switzerland, Austria and from Eastern Germany. Four very interesting papers, 30 to 45 minutes each, were submitted. At first Mr. Ebbell, the secretary of the Swiss Branch of the WPSA, from the Ovomaltine-Farm at Oberwangen near Bern reported about: "Modern production and marketing of table poultry". Dr. Fritzsche from Koblenz presented the paper: "State of research and experiences with coccidiostats", followed by Dr. Hohls from the "Bundesforschungsanstalt" in Celle with the paper: "Protein metabolism and meat production of the growing chicken". Finally, Prof. Dr. Mehner, the director of the "Bundesforschungsanstalt" in Celle reported about the development and the tasks and research problems of his station. In the afternoon, an animated discussion followed the presentation of the papers. The Meeting ended with the opportunity to inspect the research station with its many different small animals and the interesting laboratories.

ADDITIONS TO MEMBERSHIP LIST OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

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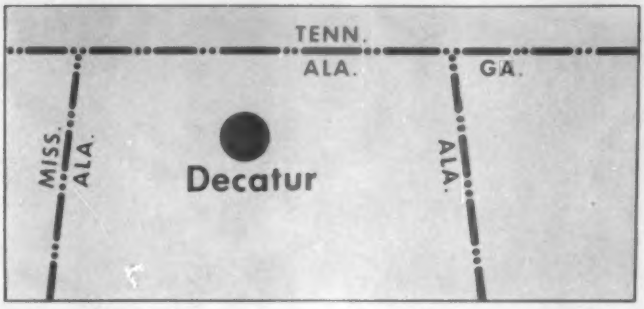

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KEMITRACIN is a chemically pure antibiotic complex which provides the feed industry with an antibiotic of the highest uniformity and purity. It is used in the feed at the same gram level as any other quality antibiotic for disease control, improving egg production or for growth promotion.

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WHITSYN products utilize synergism to gain maximum effectiveness in coccidiosis control with a minimum drug dosage. There is a product for each phase of coccidiosis control. WHITSYN-S is used in the drinking water for treating outbreaks. WHITSYN-5 is used in the feed for treating outbreaks. WHITSYN-10 is used in the feed for preventing coccidiosis. Each product is effective against both the cecal and intestinal types.

Your request for additional data on these—or on other Whitmoyer products—will be most welcome. You are cordially invited, too, to consult with our staff members on poultry health or nutritional matters.

25th ANNIVERSARY YEAR

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Effectiveness of Energy-Protein Ratio Depends on Proper Amino Acid Balance

It is felt by some authorities that the important biological factor of protein quality is oftentimes overshadowed or overlooked due to the significance attached to the mathematical value of a protein-energy ratio. For highest feed efficiency at lowest feed cost, protein quality must be looked upon as being just as important as the amount of protein in the diet.

Proper amino acid balance — the most accurate indication of protein quality — is essential, otherwise the animal cannot make efficient use of the energy and other nutrients in the ration. In fact, a deficiency of an essential amino acid can cause failure of the entire diet.

Methionine is one of the essential sulfur amino acids necessary for proper amino acid balance and is the one most likely to be deficient in poultry starting rations. Experiments and field results have proved beyond doubt that supplemental methionine will increase feed efficiency and improve feathering and market finish of birds.

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U.S.I. is the pioneer producer of methionine, the low-cost, essential amino acid. Rations that are supplemented with DL-Methionine produce increased return over feed costs and a more rapid growth rate. Methionine is also effective in improving feathering. Your best supply — from U.S.I.

U.S.I. Feed News A Regular Feature

Each month U.S.I. publishes a full page FEED NEWS in the leading publications reaching nutritional and feed formulation specialists. Informative items of interest to all who use feeds and feed supplements are included. Follow this series in U.S. feed publications for new developments in the poultry feeding industry, or send us your name, address and title on your company letterhead to be placed on our mailing list.

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- U.S.I. RIBOFLAVIN Products
- U.S.I. NIACIN
- U.S.I. CALCIUM PANTOTHENATE Products
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